for VICTORY ... — Work Harder ... — Stop Waste ... — Buy Bonds

Contractors and Engineers Monthly

Vol. 39, No. 11 NOVEMBER, 1942 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Concrete for Army Depot**
  Confronted by the problem of just one location for the batching plant to serve the vast expansion activities at an Army Depot, the contractor devised an ingenious plant layout, making the best of the tight quarters, and delivered 1,000,000 cubic yards of concrete in five months. See page 1.
- **Conserving Equipment**
  Yankee ingenuity comes to the fore in these days of essential conservation of present equipment. An article in this issue describes the various ways and means used by the New Hampshire Highway Department to make its equipment last longer. See page 1.
- **Paving at Air Base**
  Various types of bituminous paving were used for runway shoulders, taxiways and streets at an expanded Air Base in the southwest. The plants to produce the paving materials and the methods of laying it are described in this issue. See page 2.
- **Flood-Control Projects**
  Two important flood-control projects, one in New York State and the other in Illinois, involved river channel paving, the placing of a high flood wall and the construction of an earth levee. See pages 2 and 11.
- **Vital Highways Improved**
  The work to improve two important Federal routes is described in this issue. In Georgia, 56.896 miles of the SN Coastal Highway has been widened and resurfaced with a hot-mix retread, while in Texas a maintenance-construction job put U. S. 80 in the best possible shape for the increasing traffic using that highway. See pages 7 and 21.
- **Sodding at Airfield**
  The contribution made by a contractor in effective sodding of 850 acres at an Army airfield, including the extra work of daily sprinkling to combat the effects of an unusually dry season, is described in this issue. See page 33.

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C. & E. M. Photo
A single-wheel roller made in the N. H. Highway Department shops.

Ingenious Savings In Highway Garage

N. H. Highway Department Effects Economies in the Hardening of Grader and Plow Blades; Other Items

(Photos on page 54)

✦ IN these days of reduced income from gas taxes, state highway departments are practicing every economy possible to make the income meet the maintenance needs of the highways. Visiting the State Highway Department garage and shops at Concord, N. H., recently, we were shown some very real economies that should be passed on to other state and county shops. These items cover longer life for snow-plow and grader blades, a new material for rotary brooms to replace imported rattan, single-wheel rollers built for towing by trucks, and redrawing the teeth of rakes for removing oversize stone from pit-run gravel.

Today more than ever before the junk value of a piece of equipment is appreciated. In New Hampshire a careful study is made of the machine to be sure

(*Continued on page* 12)

Big Batching Plant In Tight Quarters Serves Army Depot

Plant Serving Group of Contractors for Midwest Depot Expansion Delivers Million Yards in 5 Months

✦ BATCHING plants are usually located in spacious areas, permitting easy maneuvering of trucks and ample siding for the storage of aggregate cars. Quite the opposite was the case at a midwest plant delivering both dry batches and batches to truck mixers at a large Army Depot project. There was just one location for the batching plant, and there it went, making the best of the difficult situation.

It was set up in a triangle, one side of which was formed by the heavy-traffic highway leading to the Depot, the second side by the multiple-track main lines of two major railroads carrying a heavy freight and passenger service averaging ten trains an hour throughout the twenty-four, and by a multiple-track spur to the Depot on the third side, with only just enough room left to get the batch trucks and truck mixers in and out.

To overcome the absence of adequate spur track for bulk-cement and aggregate car storage, the contractor installed a two-stub spur. The existing siding was used for bulk-cement tank cars and permitted storing only one car while a second was being unloaded to the 600-barrel cement bin. On the opposite side of the batching plant, alongside the freight and passenger tracks, the new siding permitted unloading one hopper-bottom car and storing three cars on each stub beyond the switch and one at the switch. This storage took care of the requirements very well since two switchings were available daily and the contractor used a minimum of eight cars of sand and gravel each 12-hour day. After spotting by the switch engine, the cars were moved by an old winch truck that buzzed around like a busy mother herding her children, and occasionally rushed away to look after other work.

Unloading Aggregates

The aggregate cars had to be switched across one main line from the other, but the contractor divided the routing over both railroads to insure harmony. The bottom-dump cars were spotted over a pit beneath the tracks where a Columbus Conveyor Co. 20-foot unloader with a belt 30 inches wide driven by a 10-hp Master electric motor picked up the sand or gravel and delivered it to the boot of the bucket elevator which was powered by a G-E 15-hp motor. For protection, the 55-foot high elevator had galvanized iron sides and bottom to stop scattering of the gravel and prevent injury of persons below. This plant had been a permanent installation for a commercial transit-mix plant in the nearby city but to prevent congestion over the hauling streets and reduce the number of trucks required for hauling both dry and wet batches, it was moved close to the site of the construction.

Two men were used in the cars to keep the materials flowing to the unloader and to clean up around the plant. One man at the top of the bucket elevator controlled the four-way chute to deliver the material to the right one of the four bins, and the controls for the unloader and the bucket elevator were located there.

Handling Bulk Cement

Columbia cement was delivered in bulk by tank cars on the siding and unloaded to a pit equipped with a screw conveyor to the elevator of the Erie bulk-cement plant capable of storing 600 barrels. To prevent arching of the cement in storage, thus delaying delivery to the weighing batcher, a Brunner garage compressor was installed on the operating floor of the plant, with connections to the delivery chute of the cement bin, so that the material could be "fluffed" as required to insure easy flow. From the delivery end of the chute, a spiral conveyor inclined upward carried the cement to the weighing batcher. The upward slope is the best possible insurance against over-run of the cement when the spiral conveyor is stopped. This conveyor was run at one speed with a clean cut-off.

(*Concluded on page* 46)

NEW BRIDGE ON MILITARY LOOP HIGHWAY IN TEXAS

C. & E. M. Photo
The new Leon Creek Bridge at San Antonio has a 28-foot roadway and is 468 feet long with 11 concrete-girder and slab spans 42 feet long. The piers rest on blue shale with the highest pier 40 feet from bed rock to the deck. No piles were required for the foundations. Holland Page of San Antonio was the contractor and A. Schlafli, Resident Engineer for the Texas Highway Department.

Varied Paving Types Used at SW Air Base

Cold-Mix and Hot-Mix, Also Inverted Penetration on a Selected Gravel Base, Were Included in Paving

✦ AT an expanded air field in the southwest, the three concrete runways vary in length from 5,500 to 7,300 feet and have cold-mixed asphalt shoulders on either side. The taxiways were built with the same cold-mix for the base course and a hot-mix top, while a large motor pool or yard and the streets serving the air base were constructed of a stabilized gravel base and an inverted-penetration top. Many complications as to aggregates, the selection of the proper grade of asphalt and its proportions in the mixes were ironed out with the help of the well-equipped laboratory of the District Office of the State Highway Department.

Cold-Mix Operation

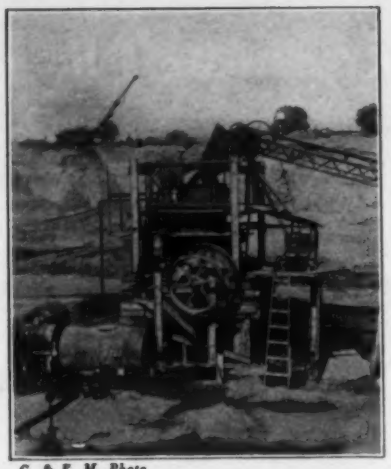
The plant for the cold-mix material was set up in a gravel pit about 3 miles from the air base where the pit-run material was reasonably satisfactory. The top of the pit was stripped to remove excess clay so that the material ran somewhat less than 12 per cent clay in the mix. A dragline operating from the top of the pit picked up the material, loading its bucket so as to average the strata in the pit, and delivered the gravel to trucks on top. They dumped the loads onto a pipe grizzly over a vibrating screen that rejected all material over 1½-inch screen size. The material passing the screen went directly to a long belt conveyor carefully timed to deliver approximately 3,700 pounds of material in 45 seconds, the time of the mix in the pugmill. The batches were weighed as the material dropped off the upper end of the belt, but the flow of material was not stopped when the weighed 3,700 pounds of aggregates were dropped into the pug mixer with the 5 per cent asphalt. The speed of the conveyor provided for this so that within the limits of accuracy of field operations the work was acceptable. The trucks hauled 4 cubic yards of the material per load.

The gravel at the pit ran from 4 to 6 per cent moisture which was not sufficient to permit the proper dispersion of the sand-clay material throughout the mixture during the 45-second mix. When the moisture was boosted to 8 per cent by the addition of water to the gravel on the conveyor, the mix was much more homogeneous. When spreading the mix on the runway shoulders, it was necessary to aerate the material to 2 per cent moisture before starting rolling. This added moisture increased the time necessary for laying the mix from 8 to 12 hours to as much as 36 hours, depending on the moisture in the air.

Laying the Cold-Mix

The cold-mix material was spread on the runway shoulders in two 3-inch layers. However, it was found after the first few days that better results were obtained if the base course was laid 3 inches thick and then the top layer spread in as thin layers as possible and rolled continuously. This resulted in approximately three 1-inch layers for the top. The material was dumped from the rear-dump trucks and then spread and aerated by two Austin-Western 99 and two Caterpillar power graders. The initial rolling was done by three Bros pneumatic-tired rollers, following immediately behind the battery of graders. The finish rolling was done by a 10-ton 3-wheel Austin steel-wheel roller.

The runway shoulders were sealed with an application of 0.2 gallon per square yard of OA-135 asphalt covered with washed gravel, 100 per cent of which passed a ½-inch screen. The gravel was spread by a Buckeye spreader box at the rate of 150 square yards for each cubic yard. Rolling and brooming completed the sealing operation. The OA-135 asphalt is a soft bitumen of high penetration and was used also in the hot-mix.



C. & E. M. Photo
The 3,700-pound continuous-mixing pugmill plant for runway cold-mix material.

The Hot-Mix Operation

The taxiways were paved with a base 6 inches thick of the same material as the runway shoulders and then a surface course of 2 inches of hot-mix. This was produced at a commercial plant about 4½ miles from the air base. The plant had a drum-type feeder for the aggregates which included crushed limestone, coarse sand and local fine sand run through the plant drier and then to the four hot bins over a 3-deck electric-driven vibrating screen. The bins carried 8-mesh, 5/16-inch, 9/16-inch and 1¼-inch screen-size material. The plant had 25,000-gallon storage capacity for asphalt against any delays in shipment and delivered the hot asphalt to

(*Concluded on page 17*)

New Channel Paving To Eliminate Floods

Spencer & Ross, Inc., Paved 3,000 Feet of Channel in Canisteo River, Placed High Precast Concrete Crib Wall

(Photos on page 54)

✦ PROJECTS to increase the non-damaging capacity of the Canisteo River through the City of Hornell, N. Y., from 6,000 to 21,000 cfs have been under construction under the direction of the Binghamton, N. Y., District Office of the U. S. Engineer Department for several years. The first two projects were completed in June, 1939, by hired relief labor.

The purpose of the contract to be described in this article was to canalize the Canisteo River and its two tributaries in the City of Hornell by straightening, widening and deepening the channels. Where space permitted, levees were built and where there was no room, new walls were built or existing walls were capped and faced so as to raise them, and the channel paved between the walls. Above the Main Street Bridge only the slopes were paved, and stone paving was used on the parts of the levees exposed to scour action. The contract for this so-called middle section of the improvement in Hornell was awarded to Spencer & Ross, Inc., of Detroit, Mich., on its bid of $1,466,560. Work started in August, 1939, and the contract completion date was the spring of 1942 but actually the work was completed in the autumn of 1941.

The full channel section is 120 feet at the bottom, with side slopes of 1 on 2½. On 750 feet of this contract, located above the Main Street Bridge, where the flood walls converge from 180 feet apart to 130 feet apart, only the slopes were paved. This is a transition section between the full-width channel as protected by levee and that confined by walls.

(*Continued on page 50*)

Scenes on the Spencer & Ross contract for channel paving in the Canisteo River at Hornell, N. Y. At left, channel excavation by a Bucyrus-Erie steam crane and a Lorain 40; below, grading the slope for the channel paving; and at right, paving the graded slope.

C. & E. M. Photos

State Dept. Shops Aid Army Teaching

Arizona Highway Department Contributes Truck Cut-Away To Demonstrate Operation; Aids Survey of Machine Tools

✦ A VERY definite direct contribution to the armed forces of the United States has been made by the Arizona Highway Department through its Equipment Shops and the Superintendent of Equipment, George E. Steisel. This has been acknowledged to J. M. Proctor, Chairman, State Highway Commission, by the Commanding Officer, 93rd Infantry Division. His recorded thanks express appreciation for the cooperation of the Arizona Highway Department for the use of "metal cutting and welding equipment at the State Highway Department shops to design and construct illustrative models for use in demonstrating automotive technique and operations for the Division mechanic classes." The Commanding Officer also said, "By having this equipment, we are better able to instruct the drivers and mechanics of this Division in motor maintenance and thereby, through the conservation of vehicles that would otherwise be lost or damaged by improper maintenance, contribute materially to our successful prosecution of the war effort."

Pick-Up Truck Cut-Away

The chassis of an obsolete Chevrolet pick-up truck that had been designated for disposal as scrap was salvaged and the motor cut away to show the valve action, the piston travel, the operation of the oil pump and the interior of the crankcase. A piece of the transmission case was also cut away to show how the gears work, and the same was done to the differential. Two wheels were cut out to show the brake action. In order to do this, it was necessary thoroughly to clean the machine and the various parts. This work was done by three men designated from the 93rd Division, one of them a former State Highway Department employee. The machine work on the model was done by State Highway Department mechanics.

Added to the collection for instruction purposes was an old carburetor, a cut-away generator and a distributor head cut open to show the action of the rotor. All of these parts were carefully machined and then painted as well as though they were to be displayed at an automobile show.

The machines are being used now in the classes for the Quartermaster's Motor Transport School by the Automotive Advisers who oversee the mechanics' and drivers' classes where instruction in the

(*Concluded on page 47*)

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The Graveyard Shift—Let's Work Harder

In discussing with a Protective Security Officer the general problems involved in keeping track of the various nationalities and races on one of our largest, in area if not in money expended, war projects, I found him very much concerned over the attitude of the laborers. There was no actual agitation, but there was certainly little endeavor to push the vital war project to completion. As an example, he reported that the truck drivers and machine operators on the graveyard shift let their fuel tanks run dry and simply pulled off the road and slept out the shift with no attempt to get back into productive operation.

Suppose a combat column went into its graveyard shift that way! With no check on the fuel, where would *they* be?

There is some question in our mind whether the job was being managed properly if such conditions can occur. Some one should have been responsible for the checking of every fuel tank before each shift and there should have been some check on the fleet of hauling trucks between the shovels and the dump,—a trusted man, a guard who would not let deserters slip by, who would keep his detail awake, alive to the situation. We are fighting a war in Asia, in Australia, in Africa, and in Europe, and the home front must be guarded against traitors who delay completion of projects 3,000 or even 6,000 miles from the fighting front, but which are vital to the success of fighting on all fronts.

That the real trouble may rest with the leader, the contractor himself, or his Project Manager, is a possibility. The ability to stir labor to a patriotic zeal on a war project has been well demonstrated to us by a Project Manager on a war contract that merits a "Biggest" of its kind. This Manager knows all his key men, speaks to all the laborers he meets in his several daily rounds of the job, and some at night when he works the graveyard shift. The men like to see him coming because he notices good work, and comments on it to them with a word of encouragement. He does not have labor trouble because he insists that the business agents of all the crafts on his jobs come in and see him regularly so that they know each other, and can talk things over before they grow to "misunderstandings". On his war job a vital piece of welding was holding up the entire project because of delay first in the design and then in delivery of the steel. He talked the bottleneck over with the foreman of the welders on the day shift one morning and the foreman suggested that the men put in the entire weekend, a long holiday weekend, on that truss, so that it would be ready for the Monday steel shift. Those men gave up holiday plans and every man on all three shifts put in his full time and the truss was ready for use Monday morning.

Labor, Management,—the responsibility for the speedy completion of every war project lies in your hands jointly. Business Agents, Foremen, Project Managers, Superintendents,—this is your war just as much as it is for the man in uniform. You are making the money and he is eating dust and dirt in every land over the globe. Yes, he will be in the Low Countries soon, in Germany and Japan, fighting, fighting, fighting! Are you working, working, working, working so that the fighting men at the front, the Marines, Navy, Air Corps, Tank Troops, Artillery and Infantry, will have everything they need for a final victory at the earliest possible date? If not, you are a traitor to the cause of freedom for the world, peace and the opportunity to live in contentment, with the things you have been used to in the past. It is a case of that or slavery to the Axis powers for generations, starting with you. Let's work harder!

A Texas Post-War Project

As a part of the Texas Highway Department's post-war construction pool, the improvement of 14.5 miles of the Devil's Backbone Highway between San Marco and Blanco is being planned. Rugged scenery rivaling the canyons is visible on both sides of the present narrow gravel road. The new highway, which will be constructed at a cost of $4,000 to $5,000 a mile for grading and $1,000 a mile for bituminous treatment, will open to the traveling public a delightful skyline drive.

OPA Amends Schedule For Equipment Rental

Maximum Price Regulation No. 134, controlling rental prices for construction equipment, has recently been amended in such form as to greatly broaden its application. The new order, effective October 22, is known as Amendment 3 to Maximum Price Regulation No. 134 and covers operating or maintenance services as well as rental charges for equipment. Although the amendment makes several adjustments and changes in the new price schedule, it does not change materially the general price level as provided in the original order.

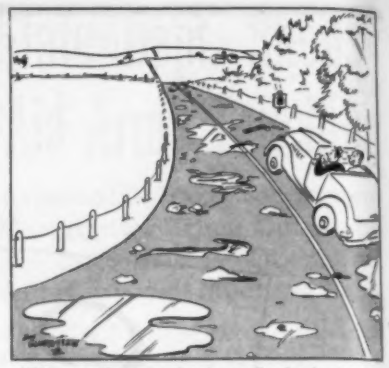
Under this new amendment, the rate schedule has been clarified and extended explicitly to cover fractional weekly and monthly rental periods, and a method for establishing maximum rentals on an hourly basis is included. Maximum rentals for additional items of equipment, such as air receivers, backfillers, suction hose, fine graders, belt loaders, bituminous mixers and pipe layers, have been added to the list of individual items for which dollars-and-cents maximums are provided. The list of types and sizes of different kinds of equipment given dollars-and-cents maximum rentals has been doubled to cover more than 1,000 different items. Charges for related rentals and services which formerly were covered by other regulations now come under Regulation No. 134, as amended.

Operating or maintenance services are defined by the amendment to include all repairs or maintenance work on construction or road maintenance equipment, whether rendered on or off the job, and also the supplying of an operator, mechanic or oiler for the operation or maintenance of such equipment and the supplying of fuel, oil or other lubricants in connection with any of the repair or operating services.

All repair or operating services on construction and road maintenance equipment under the rental regulation, whether performed on a "fully operated", "bare", or other basis and whether on or off the job, are covered by the regulation. Of course, the sale of fuel oil or repair parts, independent of any service, is not included in this coverage, but remains subject to other applicable regulations.

The provisions for services in Maximum Price Regulation No. 134, modeled closely after the services provisions in Maximum Price Regulation No. 136, provides that if the supplier of services on construction equipment had an established rate on March 31, 1942, for that service, his maximum price is the net charge he would have received on that date.

The new schedule increases the rates for some equipment as high as 25 per cent while others have been reduced as much as 20 per cent. Rates for power shovels have been increased approximately 10 per cent and for concrete finishing machinery 25 per cent. On the other hand, rates for air compressors have been reduced approximately 20 per cent.



"It's really our best road—just camouflaged to *look* like a detour!"

Access-Road Traffic Studied Carefully

The Highway Planning Survey and the State Traffic Advisory Council of Utah have collaborated in a very careful study of traffic on the highways between Salt Lake City and Ogden serving an Air Base and other facilities in the area. These studies have clearly indicated the topsy-turvy character of traffic in wartime and show the need for careful traffic studies at present, rather than relying on mental adjustments of older traffic surveys. For example, traffic on U. S. 91 between Salt Lake City and Ogden has increased 50 per cent while statewide traffic, based on gas-tax returns, has decreased 10 per cent.

The area between the two cities mentioned has been sparsely populated and most traffic heretofore has been long-haul or farm-to-market traffic. Now, there are nearly 6,000 people employed at the Air Base, another 10,000 are expected at a nearby Navy Depot, and an Arsenal in the area accounts for another 6,000, all civilians who must live within a reasonable distance and who must share their cars to save tires.

The State Traffic Advisory Committee in its recent extensive studies of employee traffic found that, prior to the "share-your-car" orders, the average was 1.8 passenger per car, but now it is better than 3.0, with many cars rolling in with 5 to 7 passengers in sardine formation. At one of the reservations, an employee driving to work alone is given a week to get at least two passengers, under penalty of not being allowed to park his car inside the reservation. This has been found most effective.

In its "Drive-under-35" campaign, the State Highway Patrol is planning the use of warning tickets to all found driving faster than War Speed. Those who are given these tickets will automatically become ineligible for tire rationing, whether war workers or not. The Traffic Advisory Committee is giving much study to this before putting it into effect. It warrants considerable study by authorities in other sections of the country as it offers the best curb we have yet heard discussed on those war workers who think that the money they are earning should be spent quickly in "hot spots" which are most quickly reached by fast travel in automobiles. They know they can get more tires because they are war workers sharing their cars with others. And they are permitted to waste a precious material which *must* be conserved. Think this over!

The How, Why and When Of Tractor Maintenance

A 46-page pocket-size book "Keep 'Em Working" has just been published by Caterpillar Tractor Co., Peoria, Ill., to help owners of Caterpillar products get the most out of their machines in these critical times. Supplementing operators' instruction books, it gives the reasons behind the maintenance and operation instructions, goes into greater detail on the care of certain critical parts, and gives general information that is not conveniently available elsewhere.

Owners of Caterpillar equipment interested in receiving a free copy of this book should request Form No. 7609 and mention this review.

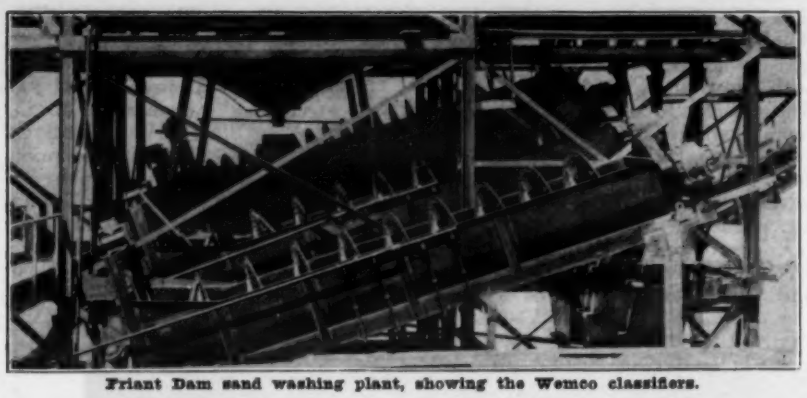
Vacuum Concrete Bulletins

Three new bulletins on the Vacuum Concrete process of improving the strength of concrete and reducing shrinkage have been issued by Vacuum Concrete, Inc., 4210 Sansom St., Philadelphia, Pa. The first, "Step-by-Step," gives details of interest to contractors with illustrations timed by the clock. The second is for the engineer and gives more details and designs, while the third, "Speed and Economy for the Contractor," gives complete information on the advantages of this method of processing concrete to the contractor.

Copies of these bulletins will be sent free on request by Vacuum Concrete, Inc., to those mentioning this item.

Victory Fleet Flag To Wickwire Spencer

The Maritime "M" pennant and Victory Fleet Flag was awarded to the Palmer, Mass., Plant of Wickwire Spencer Steel Co. of New York at appropriate ceremonies on October 14. The presentation was made by Commissioner Thomas M. Woodward, United States Maritime Commission, who pointed out that this is the first "M" award to be made in New England.



Friant Dam sand washing plant, showing the Wemco classifiers.

A Sand Classifier For Gravel Plants

A screw-type classifier for service in large sand and gravel plants is described in detail in Bulletin No. S.C. 941 of the Western Machinery Co., 760 Folsom Street, San Francisco, Calif. This Wemco classifier consists of a longitudinal sloping round-bottom tank with a continuous screw attached to the main shaft running the entire length of the tank. The shaft is an extra heavy pipe and the arms supporting the spiral are cast steel clamped securely to the shaft. The spiral flights are of steel plate sections preformed to the proper pitch and bolted to the cast steel supporting arms. Both ends of the main shaft are supported by large bearings. The lower end has a patented submerged-type anti-friction bearing totally enclosed, grit and moisture-proof, immersed in lubricant and having an automatic packing take-up. The upper bearing is a special babbitt and ball bearing arrangement.

The motor-driven lifting device, which permits raising the spiral out of the tank during a shut-down and eliminates the necessity of draining the tank, is a cut-tooth worm gear assembly running in oil, operating a vertical screw rod which is attached to the submerged bearing casing. The spirals can be lowered into the settled materials while rotating and will dig into the sand and reestablish the circulation. Hand-operated lifting devices are furnished with the smaller machines.

The Wemco classifier has a high sand raking capacity with no back slip, the replaceable flight shoes are made of wear-resistant alloy, the steep slope simplifies closed-circuiting, and it is equipped with an adjustable overflow weir.

Although used mainly in ore treatment and processing plants, Wemco classifiers are equally adapted to sand and gravel plants. The first major job of this type on which Wemco classifiers were used was the aggregate plant for Friant Dam, where a 20-foot hydroseparator and four 60-inch Wemco classifiers were installed.

Copies of the bulletin on these classifiers, with many illustrations and dimension diagrams, will be sent promptly on request to those writing to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Rust-Preventing Paints

A new 20-page catalog on rust-preventing paints has been released by the Rust-Oleum Paint Corp., 2425 Oakton St., Evanston, Ill. The catalog includes descriptions of special coatings designed to inhibit the corrosive action of fumes and humidity, and special applications to be used where wide variations in temperature require unusual elasticity. It also contains directions for the proper application of these rust preventive coatings, color chips illustrate the variety of products available, and there are explanations of where and how these materials may be used to insure maximum protection.

Copies of this catalog may be secured direct from the manufacturer by mentioning this item.

New Fire Retardant For Wood Structures

The increasing use of wood in new construction, for scaffolding and for office and dormitory structures on construction projects constitutes a real hazard to life and to the many records which must be stored in such buildings. A new fire-retardant solution Firepel, designed for application by brush or spray to unfinished wood surfaces, has been announced by the Albi Chemical Corp., 9 Park Place, New York, N.Y.

The Inspection Department of the Associated Factory Mutual Fire Insurance Companies in Boston recently made a thorough examination of the qualities and properties of Firepel at their Everett, Mass., Test Station. Treated and untreated structure sections were tested under severe fire conditions by exposure to simulated magnesium-thermit and gasoline-fuel oil incendiary bombs. Reporting on the results of the tests, Norman J. Thompson, Director of the Factory Mutual Laboratories, stated, "It is concluded from these tests that the fire-retardant material is effective in reducing the susceptibility of the wood to ignition and spread of combustion. Unlike most fire-retardant coatings applied without pressure impregnation, the material under test does not depend on an insulating coating or non-combustible film to protect the wood. The fire-retardant effect obtained by absorption of the chemicals is not as quickly destroyed by the destructive distillation of the wood as is the case with the non-combustible film-type coating."

Complete information on Firepel will be furnished to those interested who write direct to the company and mention this item.

A Hot-Mix Retread On Coastal Highway

W. L. Cobb Construction Co. Completed 56.896 Miles of Widening and Resurfacing On Georgia-U. S. 17

(*Photo on page 54*)

✦ THE importance of U. S. 17 in Georgia has increased by leaps and bounds in recent years with the mounting volume of Florida traffic. With the naming of this route as a vital link in the strategic network, the plans of the Georgia Highway Department for widening and resurfacing 56.896 miles of the highway from Darien to the Florida line became of paramount value and interest.

North of Brunswick the highway runs over an old railroad right-of-way where, in places, the piling worked up through the base and had to be dug out. The old 18-foot pavement was widened 1 foot on each side, using a coarse-aggregate hot mix containing ¾ to ¼-inch aggregate which was put down 6 inches thick in a trench. Over this a leveling course containing ½ to ¼-inch stone was placed. Both these mixes were blended with No. 40 screen sand to fill the voids. The surface treatment of this section consisted of a 40-pound per square yard application of ¾ to ⅜-inch slag placed by a spreader box over a tack coat of 0.4 gallon per square yard of 180 to 230-penetration asphalt. The top was then shot with a very light application, about 0.08 gallon per square yard, of the same asphalt and covered with 60 pounds per square yard of hot plant-mix sand-asphalt seal, giving a top course about 1 inch thick.

On the 9.295-mile section south of Brunswick in Glynn County the old limerock base was frozen in the winter of 1940-41, requiring considerable repair. It was scarified, reshaped and given temporary surface treatment after widening 18 inches on each side with 6 inches of asphaltic-concrete hot mix. The present contract described in this article is for a ½-inch plant-mix sand-asphalt seal.

A Three-Car Portable Plant

The general contract for the project was awarded to W. L. Cobb Construction Co. of Decatur, Ga., while the production of the hot plant mix was done under a subcontract by Highway Construction Co. of Brunswick, Ga., using an unusual three-car portable asphalt plant. The three cars are designated as the blower car, mixer car and asphalt car. The blower car is 70 feet long and contains a Buffalo Forge Co. blower driven by a Waukesha motor to draw the air and vapors from the driers. Also mounted in this car is an International 75-hp diesel engine which drives the drier through reduction gears. The remainder of the car contains the twin Cummer driers, which are 30 feet long and 5 feet in diameter, with a loading hopper mounted above the inlet end of the driers. Each drier is equipped with a 6-inch Hauck fuel-oil burner to provide the heat for drying the aggregate.

The asphalt car, at the far end, carries a 25-ton capacity asphalt storage tank and three cylindrical fuel tanks having a total capacity of 3,000 gallons. A C. H. & E. transfer pump is used to move the fuel oil from delivery tank trucks to the car tanks, and it then flows by gravity to the burners. Mounted on the ground adjacent to the asphalt car is a Warren Bros. asphalt pump which moves the heated asphalt from the tank cars to the storage tank, and the same pump is used to deliver asphalt to the weigh bucket. Instead of the usual loop of pipe which is tapped periodically for drawing off asphalt to the weigh bucket, this plant has a 10-foot vertical pipe above the asphalt storage tank which gives sufficient head for the asphalt to flow readily through a steam-jacketed line to the weigh bucket. When asphalt is not being drawn off to the weigh bucket, the discharge is directly back to the storage tank. This saves duplicate piping between the asphalt pump and the weigh bucket.

C. & E. M. Photo

The portable driers and mixing plant of the Highway Construction Co., set up to furnish retread for the Coastal Highway south of Brunswick, Ga.

From two to five tank cars of Mexpet asphalt from Savannah were delivered at a time to the siding behind the portable plant. Two of these cars were kept hot, and while the second was being brought up to the required pumping temperature the asphalt pump was drawing from the first car. If more than two cars were spotted on the siding, they were merely maintained as bulk storage as the steam lines were not laid to heat and pump from more than two cars at a time.

(*Continued on page 30*)

Top photo, a broken shaft on a small diesel shovel; bottom, an economical repair job done by welding.

Broken Shovel Shaft Repaired by Welding

The value of welding for speedy and economical maintenance and repairs is once again demonstrated by the experience of the Lakeside Gravel Co., Bellvue, Wash., in putting back onto the job a small diesel shovel which was down for repairs.

The shaft which carries the swing and travel pinion for the shovel broke about 4½ inches from its end. Although a new one might have been secured, it would have taken time, causing delay in the work. So a Hobart portable arc welder was taken to the job, and the shovel was back in service the next day.

For repair, the broken shaft was fitted back into place and tack welded. Then deep V's were cut into the crack by an acetylene torch. Build-up beads were run with ⅛-inch mild steel rod. After the shaft was welded securely together, the tack welds were V'd out also. The shaft was turned during welding to keep the welds even and to facilitate safe cooling. Very little grinding was needed on the welds.

The complete repair job cost only $12.45 while a new shaft would have cost $70. In addition, valuable time and precious critical materials were saved by repairing the old shaft instead of discarding it and buying a new one.

Little New Rubber In Newest War Tire

A new rubber tire, which will serve state and county highway cars as well as civil operators and which will give 10,000 miles of service if driven at speeds of 35 miles per hour and less, has been announced by The Goodyear Tire & Rubber Co., Akron, Ohio. This new tire contains only 4 ounces of crude rubber, America's most critical material. Aside from the 4 ounces of crude used in cementing the plies, it is a reclaim tire whose materials have come from the nation's rubber scrap pile.

The tread design and entire appearance of the new War Tire are such that it cannot be told from a first-quality tire of pre-war days. It will bear the company's name on the sidewall together with the words "War Tire" stamped in a small disk. It lends itself to recapping when the original tread becomes worn. Attached to each tire will be a tag which informs the purchaser that the tire is made from reclaim and that speeds in excess of 35 miles per hour must be avoided.

Cement Dispersion In Concrete Pavement

A cement-dispersing and air-entraining agent known as HP-7 which is claimed to improve all the essential qualities of concrete, including transverse strength, resistance to wear, and freedom from scaling, has recently been placed on the market by The Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio. This new product is a combination of an air-incorporating agent with a cement-dispersing agent. The producer points out that, as HP-7 is a mixture of definite compounds in definite proportion, its use is subject to complete control.

Maximum dispersion of cement in the mix has long been recognized as necessary to the attainment of high strength and economy. The introduction of air, however, is a newer development which is not so generally known or understood. In fact, it is actually contrary to the preconceived ideas of many engineers. Space does not permit discussion of this subject, but more complete information will be found in a 24-page pamphlet "Cement Dispersion and Air Entrainment in Concrete Pavement Construction" by Edward W. Scripture, Jr., Director, Master Builders Research Laboratories, which is available from the company to those mentioning this item and publication. The pamphlet contains a detailed and partly technical account of the character, development, and use of HP-7, and of other products intended for the same purpose. It also includes reports of tests on various ordinary and special concretes at 3, 7 and 28 days.

Bridge Approach Job In Portland, Oregon

Morrison Street Bridge Shortened, New Retaining Wall Built and Pedestrian Subway Completed

By HENRY W. YOUNG

(*Photos on page 54*)

✦ THE complicated operations at the west approach to the Morrison Street Bridge, Portland, Oregon, during the construction of this section of the Front Avenue Improvement included shortening the bridge to remove its west abutment from the site of the new Harbor Drive, the construction of a 730-foot retaining wall on the Willamette River side of the Drive, and completion of an elaborate pedestrian subway system.

Proceeding north on the 25-foot outer roadway of the Harbor Drive past the Public Market Building, one drives under the Morrison Street Bridge. The southbound roadway, on approaching the bridge, has a 30-foot roadway to the west which spirals onto the eastbound lane of the bridge and similarly a 30-foot roadway permits access to the Drive from the westbound lane of the bridge. The bridge crosses the Harbor Drive at an angle of 73 degrees 36 minutes. The center line of the new 6-lane Front Street is 190 feet west of the center line of Harbor Drive.

The Retaining Wall

The new retaining wall between the Willamette River and the Harbor Drive is 730 feet long, extending 335 feet north of the center line of the bridge and 395 feet southward. It reaches its maximum height at the bridge roadway and is reduced to a minimum at the two ends.

Shortening the Bridge

To remove the old abutments of the west end of the Morrison Street Bridge from the new southbound lanes of Harbor Drive, it was necessary to shorten the bridge and to build a new abutment integral with the retaining wall. Temporary piling was driven on each side of the west end of the bridge span to provide a foundation for jacking up the whole span and supporting its weight while the necessary changes were made in the span itself. At this same time, the retaining wall was built up to the level of the lower members of the bridge. Using acetylene torches, the contractor removed three entire panels from the west end of the span. As the weight was carried by the temporary piling, this could be accomplished without damaging the structure.

New lower chords were then installed and riveted and the necessary cross-bracing members electrically welded in place. One of the photographs shows the appearance of the end of the shortened span. It will be noted that the chords have been depressed at a somewhat steeper angle than is usual. This was done so that the end of the span would rest on the abutment built in conjunction with the retaining wall instead of on the old piers some 45 feet farther inland. The south truss was shortened 46 feet 1½ inches and the north truss 43 feet 6½ inches.

The next step was to complete the excavation under the approach to slightly below grade. Then the central concrete pier wall for the approach was constructed in the 6-foot neutral area of the 4-lane Harbor Drive. From this pier wall, the approach was then carried westward over the southbound lane of Harbor Drive and the west abutment founded on ninety 60 to 70-foot creosoted piles driven to approximately 30-ton bearing.

The ingenuity of the contractor was evidenced in a special pile rig for driving both vertical and batter piles. Of the 90 piles in this abutment, 36 have a batter of 4 inches to the foot, the batter piles averaging 60 feet in length. The rig has 68-foot leads and uses a Super Vulcan 50C steam hammer, operated by a steam donkey engine. A special ball and socket joint was fabricated and installed so that the leads could swing outward for driving the batter piles. At the end of the A-frame, a steel plate was fastened which carried the metal ball. This ball in turn fits into a corresponding socket in a yoke bolted to the leads near the top of the rig.

The Morrison Street Bridge, from which three whole panels of the west span were removed.

(*Concluded on page 25*)

The phantoms are historically interesting road rollers, formerly on display at the Austin-Western offices in Aurora, and now gone to war.

Display Sacrificed For War Scrap Drive

The phantom rollers seen in the illustration, resting on the two concrete foundations, are representations of machines which once were on display at the entrance to the Austin-Western Road Machinery Co.'s general offices in Aurora, Ill. Each of these 20,000-pound units has gone to war and is now doing its bit to help Uncle Sam's blast furnaces turn out the stuff that will lick the enemy.

Both of these machines had historic significance and were, in reality, museum pieces. One was brought over from Ireland for experimental purposes, and the other was the first motor roller ever made in America. Each was a one-cylinder relic of early road-building days, and was suitably marked with a heavy bronze plaque.

Old yellowed literature, printed decades ago, carry interesting descriptions of these units, pointing out how they did not scare horses with smoke, soot or steam, and used fuel only when they actually worked. No time was wasted getting up pressure or banking fires at night and there were no risks from sparks or boiler explosions.

Although the officials of the Austin-Western organization regarded these units with sentimental attachment, they were nevertheless glad to contribute them to the war effort to hasten the day of victory and peace.

Rust-Proof Wrapping Protects Steel Pipe

Today steel must be conserved by every possible means. The largest-diameter pipe line in this country to carry crude oil from Longview, Texas, to Salem, Illinois, is being protected against external corrosion by wrapping with a special asbestos felt by a machine which first applies a waterproofing coat as the pipe is revolved. The construction of this new 24-inch war emergency pipe line will establish records both for size and for speed of construction.

The felt used in wrapping the pipe as it is laid is composed of asbestos which resists the disintegrating forces that corrode and decompose many materials. This felt is wrapped by machines made and leased by The Philip Cary Mfg. Co. Cincinnati Ohio, and serviced by Perrault Bros., of Tulsa, Okla.

Those interested in this form of protecting underground pipe from corrosion may secure samples of this product by writing direct to the manufacturer and mentioning this item.

Automatic Tagline Steadies Clamshells

It is now possible to take the guesswork out of handling clamshell buckets on booms, no matter what the angle of the boom. The Rud-o-Matic tagline, which operates on a spring principle, maintains a positive tension sufficient to steady a clamshell bucket under all conditions. There are no weights, tracks, pins, carriages or sheaves in the Rud-o-Matic which is made complete with fair lead and cable attached, and can be installed in less than one-half hour.

This device, sold by the McCaffrey-Ruddock Tagline Corp., 2121 E. 25th St., Los Angeles, Calif., is made in five different models, each designed to have sufficient pull-in of cable from the wheel to provide the desired tension for various sized buckets. Model 630 is for 3/8 to 5/8-yard buckets, Model 636 is for 5/8 to 1-yard buckets, Model 648 is for 1-yard to 1½-yard buckets, and Model 1248 is for 1½ to 4-yard buckets.

Complete data, including instructions for installing Rud-o-Matic taglines, are given in a 12-page illustrated booklet which may be secured direct from McCaffrey-Ruddock by mentioning this item.

Army-Navy "E" Award In City Celebration

On October 8, as the climax of a day of civic and military celebration in Aurora, Ill., the Independent Pneumatic Tool Co. received the Army-Navy Production Award and now flies the Army-Navy "E" pennant. The day's program highlighted Army induction send-off ceremonies, a city-wide scrap and salvage drive, Army and Navy recruiting, special religious ceremonies and a fifteen-minute period when every merchant in the city sold only war bonds and stamps.

Levee Enlargement At Lake Meredosia

Pre-Glacial Channel of Missouri River South of Beardstown, Ill., a Flood Plain In Spring

(*Photo on page* 54)

✦ APPROXIMATELY 75 miles from the dividing line between the Chicago and St. Louis Districts of the U. S. Engineer Department was a levee and channel-excavation project of considerable interest. Old levees needed enlargement to protect sections of rapidly increasing value so a contract was awarded to McWilliams Dredging Co. of New Orleans and Chicago for moving an estimated 1,860,000 cubic yards of material into the new levee by dragline at 9.2 cents per cubic yard in a section about 61,200 feet long.

The work included extensive clearing and grubbing of new levee areas, both land and river-side enlargement of an existing levee, and set-back. The work divided naturally into the Indian Creek section to the north, starting about 7 miles south of Beardstown, Ill., and crossing Illinois Highway 100, and the Willow Creek operation around the stream of that name to the south.

The Indian Creek Levee

The inspection ditch for all new sections of levee was 6 feet deep, 4 feet wide at the bottom, and 6 feet wide at the top. It was excavated by each of the draglines operating on this project prior to the start of their other operations. Levees in the Chicago District are built under slightly different specifications from those farther south on the Missouri and Mississippi Rivers. However, the Meredosia Lake levee was designed under Mississippi River Commission specifications before the Chicago U. S. E. D. District took over levee construction. Therefore, a freeboard of 1 foot was allowed, instead of 3 feet permissible under Chicago District specifications, and an excess of 25 per cent in height was required to allow for shrinkage. These two requirements are ample to take care of any expected floods with more than enough freeboard, and without the need of sandbagging which is resorted to so frequently when the limit of the small freeboard of most levees is reached. This levee has an 8-foot crown and a 1 on 3 river-side slope. The land-side slope is variable, but averages about 1 on 4. It is designed so that a 1 on 5 seep line starting about 4 feet down the river-side slope meets the land-side slope at ground level.

A Marion crawler dragline with a 75-foot boom and a 2½-yard Page bucket was used on this section. It was equipped with two floodlights, and two Union Carbide Carbic flares were also used on the levee for night work. The outfit was run by one operator and an oiler per shift on the machine, with a spotter and a hand levee dresser on the levee. In addition to the hand dresser, another laborer was used on the slope a considerable part of the time to pick roots from the material as it was placed in the levee.

C. & E. M. Photo

Method of keeping the borrow pit from flooding. The operator of the Page 621 Walker would leave a dike in the pit, as shown, to hold back water while he excavated the core material in the dry.

The levee section at this point ran from 16 to 17 feet high and averaged 2,500 to 3,000 cubic yards of material per station. The actual dirt moved by the machine was about 900 cubic yards per 8-hour shift. The dragline would first strip the top soil for dressing the face of the levee, and the balance of the

(*Continued on page* 22)

Lengthening the Life Of Snow-Plow Blades

(*Continued from page* 1)

that nothing goes to the junk yard which has real salvage value in rebuilding, strengthening or otherwise improving an existing machine or developing a machine to do the work of one which cannot now be purchased with existing priorities allowed to the Department.

Hardening Blades

It has been found more economical to harden the edge of snow-plow blades at the shop than to purchase them already treated. The softer blades, which were formerly used on snow plows, wore very rapidly and the metal curled where in contact with hard-surface pavements. To overcome this, a machine was developed by a New Hampshire mechanic with the help of the blacksmith at the State Highway Garage. The process is essentially the heating of the edge of the blade about 3 inches wide with an acetylene torch and immediately quenching the metal with a solid spray of water. This is effected automatically by the device developed.

The blade to be treated is clamped to the side of a narrow trough containing water which aids in absorbing some of the heat transmitted to the blade by the acetylene torch in heat-treating the narrow band. A track is set up in front of the trough and on this is mounted a small electric motor to drive the unit forward at the rate of 8¾ inches per minute. The two hose for acetylene and oxygen are carried from the cylinders overhead to allow sufficient freedom as the machine moves forward. The distance of the tips for the heating flame from the blade is regulated by a hand wheel as is also the flow of the two gases and the flow of water to a small manifold which delivers multiple jets of water immediately behind the flame.

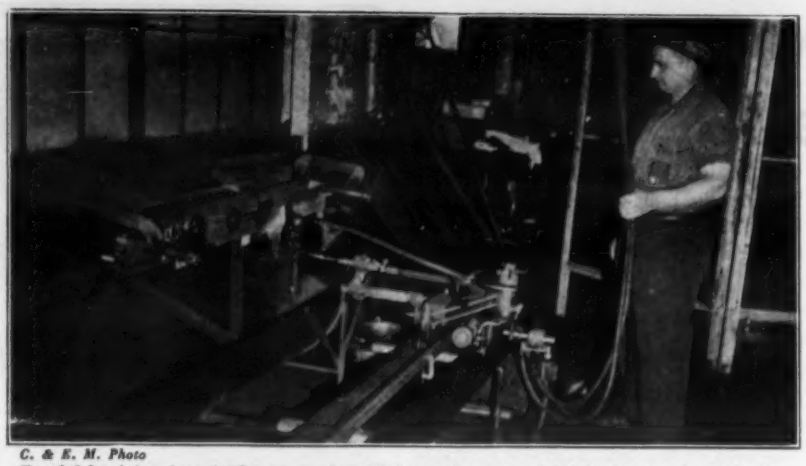
Examination of a blade after heat-treating shows that the depth of the hardening is about ¼ inch or slightly more, and it is important that the depth of the heat treatment be not less than this amount. This treatment has trebled the wear of the blades on the edge treated.

Getting Full Value

The snow-plow blades are 6 inches wide and are punched to fit the moldboards. This makes it possible to wear down the blade only 1½ inches when it must be turned and 1½ inches worn from the other edge. This leaves 3 inches of steel which was formerly discarded, but the value of blade steel today makes it necessary to use just as much as possible. All of this steel is now used by welding blades which have already been worn down 1½ inches on both edges to new blades.

"Skivings" for Fillers

Not only have the Japs deprived us of rubber, tin and other precious products for our industries but they have cut off the supply of the special rattan which we have known for so long as the filler material for our rotary brooms. Ordinarily when rattan is scarce steel is used as the filler but today steel too is precious and has more valuable uses than as a filler for rotary brooms.



C. & E. M. Photo

Special heat treatment of a snow-plow blade at the rate of 8¾ inches a minute in the New Hampshire Highway Department shops.

Over in Vermont they make bobbins for looms out of maple wood. The machines which peel off the wood to form the bobbins produce a peculiar thin sheet of wood in the process. This waste material is known as "skivings". Some ingenious New Englander realized that this material could be folded over and bolted to a strip of wood so that it would fit into the slots or core of a rotary broom. By trimming the skivings to a uniform length and attaching them to the broom core by bolts they have been found equally as effective as rattan, wear as well, are no more expensive than rattan formerly was, and today you can get skivings when you cannot get rattan.

Single-Wheel Rollers

In a previous article we have described the surface-treatment methods used annually to keep New Hampshire roads in condition for tourist and commercial vehicles. When you surface-treat up to 15 miles of road a day and have to roll it to insure a good job, you can't afford to keep a slow-moving self-powered roller on the job. An ingenious individual found a number of discarded power rollers, removed the front roll, made a welded structural steel frame to hold them and by means of a pin and short length of shaft made the rollers so

(*Concluded on next page*)

Salvage Keeps State Equipment At Work

(*Continued from preceding page*)

that they could be hauled in either direction by a truck without the need of turning the roller around on the freshly surfaced pavement and possibly tearing it up. These rollers have proved very successful, a considerable number having been made from discarded rolls of rollers which had worn out. These have been patched in various ways by welding so that they function just as well as new rollers, precious fabricated metal is salvaged and put to good use, and the bituminous-surface treatment work is speeded up as the rollers can be pulled over the roads at high speed by trucks.

Pulling Teeth

A case of painless dentistry is found in the treatment which the garage gives to the teeth of the Huntley rake used in the surfacing operations for the removal of oversize stones. These rakes are built with each tooth securely bolted to a steel channel and carefully turned and drawn to give added strength and a spring to each tooth so that they will kick the gravel across the road as the rake is drawn over the surface at an angle by a truck. While this activity wears down the teeth so that they lose their spring, they may be removed, heated and redrawn almost to their original length, thus making them slightly lighter but with the same springy character which makes them effective in their task of speedily removing oversize stone from the surface treatment. Teeth in batches of 25 to 50 are wired together, after having been removed from the rake, and shipped in from the various districts to the central garage to be drawn and put back into working condition.

Personnel

Various members of the staff of the New Hampshire State Highway Department shops are responsible for different approaches to these problems and credit is herewith given to this ingenious group of mechanics working under the direction of Frank Kenney, Shop Foreman, and Richard W. Brown, Superintendent of Equipment.

Auto Driving Less, Tax Income Drops

The latest reports of traffic and gas-tax income in the rationed and unrationed areas show that in August traffic on rural highways declined 49 per cent in the gasoline-rationed area and 27 per cent in the unrationed area, as compared with the same month in 1941. This comes from a report of the Public Roads Administration following a preliminary summary of the records of more than 460 automatic traffic recorders operated by 39 state highway departments.

Gasoline-tax collections in 31 states in August, representing fuel consumption mainly in July, totaled $47,574,000 or 20 per cent less than a year earlier. In 10 rationed and 21 unrationed states, collections were down 25 and 17 per cent respectively.

As indicative of the near elimination of "pleasure" driving, the report cites supplementary records showing the following decreases in August passenger-car traffic: 17 toll facilities from Maine to Virginia, 42 per cent; Sumner Tunnel in Boston, 30 per cent; Cross County Parkway, Westchester County, N. Y., 64 per cent; Pennsylvania Turnpike, 67 per cent; Pensacola Bay Bridge, Florida, 34 per cent; and 16 toll bridges in Kentucky, 29 per cent.

Pleasure driving is virtually nonexistent in the east, but business travel is up over a year ago in some urban areas or, at most, shows only a slight drop. Truck and bus traffic was up 1 per cent through the Sumner Tunnel, Boston, and was 51 per cent greater over the Pensacola Bay Bridge. On the 17 toll facilities from Maine to Virginia, it was off less than 1 per cent. These facilities included the George Washington Bridge and the Holland and Lincoln Tunnels in the New York City area which carried 13 per cent fewer trucks and 12 per cent more buses. Truck and bus traffic on the Pennsylvania Turnpike increased 11 per cent, but was off 26 per cent on 16 toll bridges on rural roads in Kentucky.

New Sales District For B. F. Goodrich Co.

The National Sales and Service Division of the B. F. Goodrich Co., Akron, Ohio, has established a new sales district for the Pacific Coast area, with the exception of Seattle, with headquarters in Los Angeles. Donald W. Fairbairn has been named District Manager, according to G. E. Brunner, General Manager of the Division.

Mr. Fairbairn, an Annapolis graduate, joined Goodrich in 1926, and for 15 years was Sales Engineer of the Industrial Products Division at Detroit. For the past year, he has concentrated on problems connected with the rubber tracks on military vehicles. His duties in this field have been taken over by William R. Edwards, formerly salesman in the Industrial Products Division.

Three Garage Units For County Machines

Iowa County Divides Its Maintenance Equipment Between Three Shops; Well-Planned Snow Program

✦ WITH an established policy of construction by contract, Iowa County, Iowa, concentrates on doing a thorough job of maintenance with its own equipment and employees. This leads to careful selection of the types of equipment and number of units to insure year-round care of the 150 miles of roads in the county trunk system and 790 miles of local county roads. There are no township roads.

The county is divided roughly into three equal parts for administrative and operating purposes with equipment maintenance and storage garages at Marengo, the county seat, to serve the upper third of the county, a 32 x 100-foot asbestos-shingled wood garage built in 1939 at Millersburg to serve the southwestern townships, and another at Williamsburg for the southeastern section.

The Road Program

During our interview with W. K. Chantry, County Highway Engineer of Iowa County, Mr. Chantry stressed his thorough belief in the value of doing heavy construction by contract and light construction and maintenance by county forces. On July 29, 1941, the county let contracts for 30 miles of crushed-rock surfacing on some of its farm-to-market roads. Of the 150 miles in the county trunk system, 120 were already surfaced at the beginning of 1941 and all of the remainder have now been surfaced. Of the local county roads only 125 miles thus far are graveled.

Mr. Chantry stated, "A county program must be as carefully planned under county financing as a state-wide program must be planned by the State Highway Commission in order to insure the strengthening of the weak points of the system, irrespective of political needs."

How It Is Financed

The funds for county highway construction come from three sources. A total of about $60,000 is received as a return from the state gas tax which amounts to 3 cents per gallon in Iowa, of which the counties receive 1⅓ cents in proportion to the relation of the area of the county to the area of the entire state. Counties receive no money from the vehicle tax but Iowa County levied $20,000 on personal and real property for its construction budget in 1941. Also in 1941 $50,000 was received from the state for a farm-to-market program. This money is taken by the state from that portion of the gas-tax fund which formerly went entirely to the State Highway Commission, and from the motor-vehicle tax. The legislation which makes this money available was passed in 1939 and provides that all State Highway Commission funds over $16,000,000 go into a farm-to-market fund for counties, prorated on the same area basis as the other gas-tax monies, and the money must be used for construction on these secondary county roads.

For its maintenance fund Iowa County levies $125,000 annually on real estate and personal property within the county.

Snow Control

Snow problems in Iowa County are not great, there being only about two severe storms each winter which are accompanied by high winds. As it is useless to plow during a high wind, work is not started until the wind begins to die down and then the county's three V-plows on 70-hp tractors and six V-plows on power graders are set to work from the three maintenance garages.

This county, in common with many others in Iowa, has found increasing trouble with snow on highways because of the greater use of mechanical corn huskers by farmers. These machines break off the stalk about 1 foot from the ground and thus remove one of the most effective snow breaks which could be devised in a planting. Iowa County has about 50 miles of snow fence which it tries to stretch to take care of all possible drifting.

A continuing program of streamlining of county roads has been pushed. Property owners are being educated to remove their fences and let the county put in its equipment and cut down the old "fence row" or ridge of dirt built up over a period of years by the use of cultivating equipment running as close to the property fence as possible. By rounding off this row and removing any other obstructions, such as shrubs and trees, that might trap snow on the highway, much has been accomplished to offset the loss of "corn-stalk snow fence."

The standard streamlined section in Iowa County consists of a 26-foot surface with a 1½ to 1 front slope and a backslope on a maximum of 1½ to 1, but most of the slopes on the county trunk system are flatter. Wherever possible, the elevation of the road top is raised above the adjacent country in order to permit the wind to sweep the snow off the road and deposit it in the

(*Concluded on page* 48)

Soil-Cement Bulletin With Working Details

One of the most complete discussions of soil-cement, its usefulness, and methods of working, mixing and curing, has been issued by Seaman Motors, 305 North 25th St., Milwaukee, Wis., as Soil-Cement Bulletin No. 1. In its pages will be found a complete discussion of the influence of various soils on soil-cement stabilization, methods of pulverizing and grade preparation, the spreading of cement, dry cement mixing, water application and wet mix, finishing operations, and general comments on soil-cement procedure, which are very helpful to those who are new at this type of work.

Copies of this information may be secured without cost direct from Seaman by mentioning this publication.

Universal Takes New Name

The Universal Crusher Co., Cedar Rapids, Iowa, founded in 1908 and credited with being the first manufacturer of overhead eccentric jaw crushers in the United States, has changed its name to the Universal Engineering Co., organized under the laws of the state of Iowa. Practically all that will be changed is the name, since the officers, executives and personnel remain the same, and nothing is being eliminated from the line of equipment made.

A. W. Daniels is President; H. F. Rikhoff, Secretary-Treasurer; A. H. Sargent, Vice President; L. S. Hackney, Sales Manager; and L. W. Dunlap, Assistant to the President. The new corporate name is more in keeping with the present and future activities of the company which include the design, engineering and manufacture of rock and ore crushers, portable crushing plants and road machinery, precision instruments and units for aircraft and ordnance requirements. For many months a large section of the Universal plant has been devoted to war production.

Recent figures estimate that the property damage to automobiles from January to June, 1942, would buy 479,000 Garand rifles, or 959 light tanks, or 697 pursuit planes, or 115 heavy bombers. Be careful! Every accident helps the Axis!

Sabotage of Trucks By Careless Drivers

Proper Maintenance Only Means of Keeping Trucks In Service for Duration; Watch Your Drivers

✦ UNDER wartime conditions the driver of a motor truck becomes more than ever before an important factor in truck maintenance. Careful driving prolongs the life of both truck and tires. Carelessness on the part of the driver today borders on sabotage and, if habitual, can be more harmful than occasional mistakes made by inexpert drivers. If the truck is driven properly in the first place and kept in good condition mechanically, the owner obtains maximum efficiency, economy and durability. With truck and tire production restricted, durability is highly important, but no more so than efficiency and economy. In intelligent consideration of truck maintenance, too much emphasis cannot be placed on the careful selection, training and checking of truck drivers.

Lubrication a Life Saver

Other conditions being equal, proper and regular lubrication will do more to prolong the life of a motor truck than almost any other maintenance operation.

Lubrication schedules differ for different makes of trucks. Owners should follow the manufacturer's recommendations in all cases. Generally speaking, however, certain parts of all trucks should be lubricated every 1,000 miles, and other regular lubrication operations should be performed every 2,000, 6,000, 10,000 and 15,000 miles. A variety of lubricants is required to lubricate the modern truck adequately. The important point to bear in mind is to use the right grade and weight of lubricant to meet all requirements of climatic and operating conditions and to lubricate the vehicles according to the schedules recommended by the manufacturer of the truck.

Proper attention to lubrication of the transmission and rear axle prolongs the life of these units. Use of the proper weight lubricant at these points during cold weather in particular prevents sacrificing power that would otherwise be required to turn gears against stiff, ineffective lubricant.

Strict Inspection Necessary

The modern motor truck is designed and engineered mechanically to stand up in service with a minimum of attention. Margins, factors of safety, are allowed for certain degrees of negligence and even abuse by those operating the trucks. Present conditions, however, stress the necessity for strictest inspection and care of all mechanical units.

The battery should be kept in good condition and inspected frequently to make sure that it is filled with distilled water. In the summer time water should be added about once a week, and about every two weeks in winter. The condition of the cables should be watched constantly to make sure they are in good working order.

Generators in motor trucks today are capable of producing current output ample to meet the requirements of the increased use of electrically operated accessories in addition to that required for lights and horns. Periodic inspection and cleaning of the brushes and commutator will insure the ability of the generator to produce its full current capacity. The inspection of the insulation on all wiring will insure that the electric current is delivered in full volume to the places where it is needed.

To insure full power output by the engine with maximum fuel economy, it is important to check the engine timing and to make sure that it is correct. The spark plugs should also be checked periodically to make sure that they are in good condition and that the electrodes are properly spaced. Properly spaced and properly functioning spark plugs will affect operating economy as much as 10 per cent. New spark plugs should be installed every 10,000 miles.

Fuel Must Be Conserved

The necessity for fuel conservation to facilitate the Victory effort stresses the need for special care of fuel systems in motor trucks. Fuel as well as tanks and fuel lines should be kept free of water and all foreign matter. Fuel filters should be cleaned regularly and kept in top-notch working condition.

The manifold heat control should be

(*Concluded on page* 39)

Bituminous Paving For Army Air Base

(*Continued from page 2*)

the weigh box by pump. The asphalt made up 4.8 per cent of the batch by weight as mixed for 45 seconds in the Warren Brothers 2,000-pound batch pugmill.

The mixture as spread by an Adnun bituminous spreader and compacted by 3-wheel rollers was rather open, due to holding the +10-mesh aggregates to 67 per cent for stability. With the small amount of traffic on taxiways which would further knead the surface after completion and to prevent rapid oxidation, it was thought wise to seal the surface to prevent the infiltration of surface water through the surface voids. This was done with 0.2 gallon per square yard of hot OA-135 asphalt covered with ½-inch and smaller gravel, at the rate of 1 cubic yard for 150 square yards, in the absence of any crushed stone chips in the local market. The gravel was rolled by an 8-ton 3-wheel roller to key it to the surface.

Inverted Penetration

For the streets and motor pool parking areas, a 6-inch base course of selected pit-run gravel was laid, using material with a plastic index below 12. The pit ran from sand to clay with a considerable amount of gravel. It was necessary continuously to add a blow sand to the material as spread on the roads to secure the required amount of intermediate fines. By careful blading with power graders, the sand was well mixed with the pit-run material, resulting in a compact base of stabilized material with high Proctor density values. It was rolled by the pneumatic rollers to a finished 6-inch thickness, watered and maintained for a period of at least two weeks before it was ready for the inverted-penetration top.

When in condition and the surface dry, the stabilized base was primed with 0.25 gallon per square yard of MC-1 and allowed to cure in the hot dry atmosphere for two days. Then hot OA-135 was applied at 0.25 gallon per square yard and immediately covered with ⅝-inch to 10-mesh gravel at 1 cubic yard per 80 square yards, using a Buckeye chip spreader. This was broomed by a drag broom pulled behind a truck and then rolled by an 8-ton tandem roller. The second course of the inverted penetration consisted of 0.40 gallon of the OA-135 asphalt covered with 1 cubic yard of ½-inch to 10-mesh gravel per 150 square yards of surface.

C. & E. M. Photo

Priming a street at a Southwest Air Base before laying inverted penetration top. The 1,060-gallon Etnyre distributor made all prime, tack and seal-coat applications.

This was similarly dragged, and rolled. No seal was placed on the surface because it showed a dense texture that might have been fat if more asphalt were added as a seal.

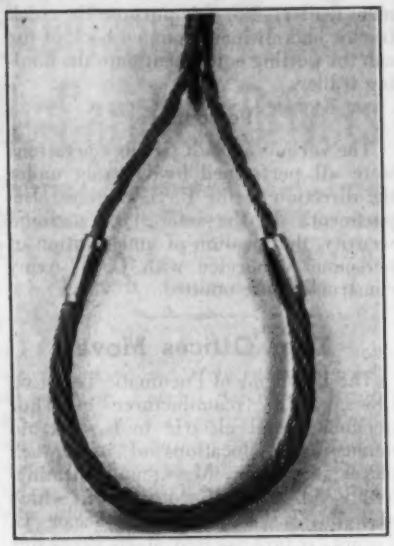
All of the asphalt application for the inverted penetration and seal coat was made by a 1,060-gallon Etnyre distributor shooting 20 feet wide. The tank was on a semi-trailer so that it could be removed and the truck tractor used to haul other units, such as a heavy equipment trailer. For this purpose the truck tractor had a winch mounted back of the cab for pulling equipment onto the hauling trailer.

Personnel

The various asphalt paving operations were all performed by contract under the direction of the U. S. Engineer Department. In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

Thor Offices Move

The Independent Pneumatic Tool Co., Chicago, Ill., manufacturer of Thor pneumatic and electric tools, has announced new locations of its branch offices in Boston, Mass., and Birmingham, Ala. The Boston Office, which also has a new manager, Vance G. Turner, is now located at 78 Brookline Ave., while the Birmingham Office has moved into its own new modern quarters at 1411 No. Third Ave.



The new Roebling Flatweave sling.

New Wire Rope Sling Handles Loads Easily

A new wire rope sling which is light, flexible, non-kinking and non-spiralling has been developed by John A. Roebling's Sons Co., Trenton, N. J., for lifting light and medium loads where the legs choke the load or the sling comes in direct contact with the load being lifted. These Flatweave slings have a flat bearing surface which allows an even pressure on each of the ropes which comprise the sling, thereby prolonging its useful life.

The Flatweave sling is made up of six separate ropes. Two pairs of two ropes are laid in opposite directions and are united into a finished sling unit by two single tie ropes which alternately pass back and forth around one pair and then the other in a spiral figure 8. This method of construction eliminates the possibility of any scissors or shearing action between the two ropes. The loops, which can be used as chokers without the use of thimbles, are generously proportioned and easily slip over crane hooks or lifting lugs. Compact steel sleeves are compressed over all rope ends, thus permanently securing them. There are no splices, tucks or servings to become dislodged or loosened over sharp corners or in pulling underneath loads.

The Roebling Flatweave sling is described completely in Bulletin A-881, copies of which will be sent on request.

Bituminous "Freeze" Is Made Nationwide

As of October 5, the glacier of bituminous restrictions which crept onto the Atlantic Coast last April and then proceeded westward has now covered the entire nation in "freezing" the use of asphalt or tar products on streets and highways. The latest order from the Office of the Petroleum Coordinator for War, dated October 5, 1942, states that the use of asphalt or any asphaltic product, including road oil, or of tar or any tar products, in the construction, reconstruction, paving, surfacing or resurfacing, and in the maintenance or repair of any public road, street, highway or driveway, or public parkway, in continental United States, and the purchase, sale, delivery or withdrawal from storage of any asphalt or asphaltic product including road oil, or tar or any tar product, for any such use, shall be deferred for the duration of the emergency, except in the case of public roads, streets, highways or driveways, or public parkways certified by the Public Roads Administration to be necessary to the successful prosecution of the war, and for construction, reconstruction, paving, surfacing or resurfacing, or for maintenance or repair, for which the Public Roads Administration certifies that the use of asphalt or an asphaltic product (not including road oil), or tar or a tar product, is essential. An exception is noted that no approval is required in the case of airport or aircraft plant surfaces on which aircraft travel, or surfaces within buildings.

The order further extends the restriction on the transportation of asphalt and asphaltic products, including road oils and tar and tar products, as heretofore. They must be transported by means of tank trucks in all movements of 200 miles or less, except in cases where suitable tank truck transportation cannot be obtained.

Recommendation No. 45, Amended, further requires the approval of the Director of Marketing of the Office of Petroleum Coordinator for War for the use of tar or asphalt on private roadways or other surfaces for vehicular use, subject to restricted use which includes military projects.

Helpful Accessories For Concreting Work

A new 45-page plastic-bound catalog of accessories for concrete construction has recently been published by Superior Concrete Accessories, 4249 Diversey Ave., Chicago, Ill. This Catalog 300 contains twenty-two pages of illustrations and text on devices for tying concrete forms, three pages on methods of hanging forms from structural steel, nine pages on accessories for use with reinforcing steel, six pages on other accessories.

A copy of this catalog will be sent promptly to those making a request direct to the company and mentioning this review.

Arsenal Warehouse Has Concrete Floors

Hand Pouring Necessary as Steel Truss Roof Completed Before Floor Was Started, Hand Screeding and Finish

✦ THE contractor for the raw materials storage warehouses at a southwest Army Arsenal chose to mix all concrete for floors at the site, using dry batches hauled from a central weighing plant. With a crane handling a bottom-dump bucket for pouring direct to the floor, work could have proceeded much more rapidly but this was prevented by the steel men getting the trusses in ahead of the floor paving. Therefore a shift in procedure was necessary, using an intermediate hopper from which concrete buggies carried the concrete into the buildings.

Mixing and Delivery

The dry-batch plant on the edge of the area of the warehouse construction consisted of a Blaw-Knox batching plant with a Koehring crane to supply the materials to the overhead bins. From this a fleet of 3-batch trucks hauled the weighed batches to a MultiFoote 27-E paver at the site of the pour. The boom of the paver was removed so that the mixed concrete could be delivered direct to a 1-yard bottom-dump concrete bucket after the 1½-minute mix. No spotter was needed at the paver as the crane operator running the P & H crane could see the paver chute and drop the bucket directly beneath it.

The bucket was swung over a buggy dump hopper where one man on a wood platform dropped the load into the hopper. Below, a gate man filled the four to six Insley rubber-tired buggies for the concrete pour.

The Buggy Runs

The well designed buggy runs were built with 4 x 4-inch legs 12 inches long, just high enough to clear the concreting operation. They had a 2 x 4-inch timber on either side as stiffeners and a pair of 2 x 6-inch stringers so spaced that the stringers on the transverse runway boards just fitted on the outside, making a secure and tight runway. The runway boards were 1 x 6's with ¼-inch openings between.

Concrete Finishing

The haul from the buggy hopper to the farthest place of dumping was only 50 feet and at grade, but four men were required to push each loaded buggy to the point of dumping and one man wheeled it back empty. The 6-inch concrete slab for the floor was reinforced at 4 inches from the bottom with welded wire fabric which was held up by two men with bent iron "lifters" while the concrete was poured beneath the reinforcing fabric.

Screed boards were set to grade 10 feet apart ahead of pouring and four puddlers spread the concrete as dumped from the buggies. Then four men used a 12-foot screed or strike-off to level off the high-slump concrete. On the second pass only two men were used while the others started the hand floating and finishing. The edge of the slab being poured was defined by a well-braced 2 x 6-inch form board. Four finishers with long wood trowels and steel hand floats finished the surface, ready for the placing of the Sisalkraft paper for curing. No water or membrane cure was used.

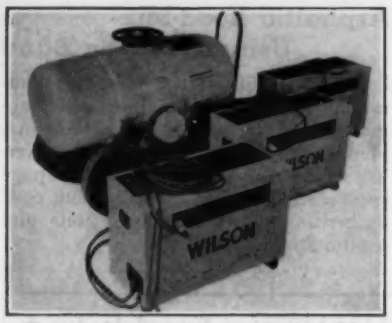
As the pouring proceeded from the back of the warehouse toward the front, the sections of buggy run were removed by a pair of carpenters, who also removed each stringer, and then, as the legs were in the concrete isolated from the run, two of the puddlers pulled the pairs of legs out and handed them to the carpenters.

Personnel

The hand-paving operation for the floors of a group of raw materials storage warehouses at a southwest Army Arsenal was done by contract under the direction of the U. S. Engineer Department. In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

Asphaltic Road-Mix Using Sand on Sand

A new specification, RM-3, for sand-asphalt road-mix on a natural sand subgrade has just been issued by The Asphalt Institute, 801 Second Avenue, New York City. Copies of this new 11-page specification are available, without cost, by writing direct to the Institute and mentioning this item.



The new Honey Bee Arc Control Station to provide better control and increased output in arc welding.

Arc-Welding Current Closely Controlled

A means of increasing the arc-welding output per machine, with better control by the operator and improved welds on thin-gage metal, are among the advantages claimed for the use of the Honey Bee Arc Control Station recently developed by Wilson Welder & Metals Co. These arc control stations are made in capacities of 75 and 150 amperes, and are an auxiliary device connected in series with the welding circuit of any constant potential arc welding generator. Most conventional drooping voltage generators can be converted quickly and easily to constant potential by means of a quick-change switch mounted on the generator. A portable switch held in the operator's hand gives the operator remote control of the welding current within predetermined limits. This switch may be combined with the electrode holder, if desired.

When two or more arc control stations are hooked up to a single generator, a like number of welding arcs can be operated simultaneously, and each operator can regulate his own current and weld as he sees fit without affecting the others in any way. Each operator has his choice of two methods of control: He can set his Honey Bee to deliver a definite current at the arc and weld steadily at that setting; or he can use the hand switch to vary the current without breaking the arc, enabling him to start his arc on cold metal with a maximum-current hot arc and to reduce the current as the work warms up.

Complete information on Honey Bee Arc Control Stations may be secured direct from Wilson Welder & Metals Co., 60 E. 42nd St., New York, N. Y., by mentioning this item and publication.

Tool Thefts Reduced By Electric Etching

A new electric etcher that permanently marks anything made of steel, iron or their alloys, by simply placing them on the work plate, turning the switch to the proper heat and starting writing has been announced by the Ideal Commutator Dresser Co., 1366 Park Ave., Sycamore, Ill. A ground clamp conveniently attached to the work plate is provided for etching large heavy parts and castings. The entire equipment may be packed up in a small case when not in use.

Hi-Lo taps and a seven-point switch give 14 etching heats between 115 and 1,300 watts. A red lamp on the front of the etcher indicates when the power has been turned on and burns brighter as each higher heat is used. The depth of mark on the metal can also be controlled by the speed of writing. The etching tool has special heat-radiating fins and an alloy tip point. The secondary cables have asbestos covering, the work plate is 4 x 7 inches with a ground clamp attachment, and the entire outfit weighs only 32 pounds.

Permanent identification by etching the proper identifying inscription minimizes the loss and theft of costly tools and instruments owned by contractors and state and county highway departments. A complete description of this new No. 18 Machine Shop Model which supplements the present line of Ideal electric markers and etchers may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Becker New Westinghouse Maintenance Sales Head

Hugo E. Becker, a Westinghouse sales engineer on the Pacific Coast since 1925, has been appointed supervisor of the newly created maintenance sales department for the Westinghouse Electric & Mfg. Co.'s Pacific Coast District. In his new post, Mr. Becker will coordinate the work of three major maintenance divisions, renewal parts, field engineering and repair plants, to minimize breakdown outages and insure uninterrupted production for war.

Michigan Conference Highway Discussion

The proceedings of the Twenty-Eighth Annual Highway Conference held at the University of Michigan, February 18-20, 1942, have been published in a 246-page volume which is available through application to Professor Roger L. Morrison, Civil Engineering Department, University of Michigan, Ann Arbor, Mich.

The wide scope of the papers covers discussions of the post-war highway program, nationally and in Michigan; new developments in the fields of highway construction, maintenance and highway materials; the care of equipment; the construction of access roads to industrial plants and traffic studies for war production transport; accident records and their use; and the use of short-count traffic surveys.

Old Ailments Cured By Asphalt Retread

High Crown and Roughness Of Section on U. S. 80 Near Fort Worth, Texas, Removed By Economical Resurfacing

(*Photo on page 54*)

✦ WHEN you cannot get enough material to whole-sole a shoe in need of repair, you are forced to be satisfied with a half-sole. That is just the situation in District 2 of the Texas Highway Department, in the Fort Worth area, where E. C. Woodward, District Engineer, is contenting himself with a half-soling job to put a long section of U. S. 80 into the best possible shape for the increasing traffic toward Weatherford and Mineral Wells. Even Texas, with its wealth of asphalt production, is feeling the freezing order on bituminous materials so, like other states, is making what they can obtain go farther.

The 18-foot roadway is now one half of a double highway leading toward the west. The high crown and rough surface of the 18-year old 1-inch rock asphalt, on which numerous seal coats had been applied, was in no condition to handle present-day traffic safely. The one-course road-mixed "half-sole" has done a remarkable renovation job.

Tack Coat and Stone

The asphalt used for the tack coat over the old surface is specified as RC2-MD, or as one asphalt man suggested "a doctored RC-2". This material is in between RC and MC, with a slightly harder asphalt than the RC-2. The tack coat was shot the full width of 18 feet with 0.15 gallon per square yard to seal cracks, then the crushed limestone from ½-inch down to 20-mesh and with about 3 per cent dust was spread over a 16-foot width of the road at the rate of 1 cubic yard per 30 square yards, using a Buckeye spreader box.

Asphalt Application

The Southern Contracting Co., contractor for the section seen under construction, used a 650-gallon Etnyre distributor to apply the asphalt for both tack coat and mixing. It was equipped with a telltale to guide the driver so that he would keep the 16-foot application of the bitumen for the mixing 1 foot from each side of the roadway so as not to lose any of the material by blowing. With this small distributor the run for a tank load was only 960 feet for the first application of 0.3 gallon per square yard for mixing. This brought the joints or turn-around points quite close together which could have been obviated by the use of a larger unit. The asphalt was brought from Fort Worth in the distributor at the beginning of the day with two attendant booster or ferry trucks, one of 1,200 gallons and the other of 700 gallons, which were sufficient to keep the distributor working all day once it arrived at the job. Another advantage of a larger distributor, such as a 1,000-gallon unit, would have been that the entire amount of asphalt for the mixing could have been applied in one shot of 0.55 gallon per square yard and the mixing been completed sooner than with the initial application of 0.3 followed by 0.25 gallon.

The second application, of 0.25 gallon, was made when the stone, thoroughly mixed with the first application, had been spread and centered over one-half the pavement, but the asphalt was applied the same 16 feet wide as before. This provided some asphalt for the portions of the pavement where low spots had been filled with the loose uncoated stone which would shove under traffic.

C. & E. M. Photos

Making the first application of 0.3 gallon of asphalt for a Texas retread and, at left, applying 1 cubic yard of ½-inch chips per 30 square yards over the tack coat, using a Buckeye spreader.

Mixing

Immediately following either the first or the second application of the asphalt for mixing, that operation was started. A pair of Adams diesel-powered graders with 12-foot blades started to turn the spread material into a windrow in the

(*Concluded on page 44*)

Handling Dirt for Levees in Illinois

(*Continued from page* 11)

excavation was in fairly heavy gumbo.

The specifications for the river-side borrow pit for the Indian Creek Levee required a 20-foot berm between the toe of the levee and the inside edge of the borrow pit. The borrow pit then sloped 1 on 3 until it reached a depth of 7 feet 21 feet from the edge, and from this point it sloped 1 on 25 as far as was needed to secure the required material for the levee opposite the borrow section. The back of the pit was required to be dressed with a 1 on 2 slope after the levee was built. The material for the Indian Creek levee was a clay loam with a small amount of sand.

The Willow Creek Levee

A considerable portion of the Willow Creek levee was placed in areas which were well wooded. The contractor was required to remove all stumps and tap roots to a depth of 4 feet, but if the roots were less than 1¼-inch in diameter they might be chopped off. The clearing was done by chopping all trees about 18 inches from the ground and piling them for burning. The larger stumps were then loosened with dynamite and all stumps were pulled out by a tractor and piled for burning. The specifications required that the ground be "scarified" to a depth of 6 inches. This could be done by removing the top 6 inches by a dragline, actually scarifying with some type of rooter, or using heavy agricultural disks to loosen the soil thoroughly to a depth of 6 inches. On this contract, the work was done by stripping with a 5-yard LeTourneau Carryall scraper pulled by an RD6 tractor. This was in lieu of stripping by the dragline.

This lower section of levee was identical with the Indian Creek section except that 2,000 feet has a 1 on 4 river-side slope and the borrow area slopes 1 on 4 to 7 feet down beyond the 20-foot berm between the river-side toe of the levee and the borrow pit. From that point the slope is 1 on 25 for 72 feet and then 1 on 4 with the same 1 on 2 back-slope as required for other borrow pits.

All excavation on the Willow Creek levee was done by a Page 621 Walker with a 125-foot boom and a 6-yard Page dragline bucket. This machine had the operator and oiler and a spotter on the levee but no slope dresser because the Page did only the roughing in and was followed up later by the Marion dragline to finish the slopes. The big machine usually scarified about 2,300 feet of levee space, came back and dug the inspection ditch and then returned, doing the rough casting for the levee section. First it built retaining dikes ahead for about 200 feet on both toes, using top dirt from the borrow pit and from the Willow Creek Channel, and then placed the wet sand between these dikes to form the core. The Page Walker was operated usually on the continuous-swing principle so that it was necessary to stop the big machine in its revolution only when the bucket was actually digging.

In excavating the channel for Willow Creek, there was so much water present which would have been out of place in the core section that the operator left a

(*Concluded on next page*)

Drainage Provided Through Dirt Levees

(Continued from preceding page)

dike between an excavated section and the material he was taking out for building the levee and then, after a reasonable length had been excavated to 40 feet bottom width and 1 on 3 slopes, he would go back and remove the 15 or 20-foot dike and let the section flood with the balance of the channel. The big Page machine handled about 4,000 cubic yards of material per 8-hour shift.

Drainage

In order to remove the natural drainage of the section through the levee into Willow Creek, 24 to 60-inch Armco corrugated-metal pipe with asphalt coating and paving was laid in the levee section and equipped with Calco gates on the discharge end. These permit water to flow out from natural drainage channels during low water and prevent water entering through the same pipes during high water in the river. During this, section ditches on the land side of the levees lead to a pumping plant equipped with a 25,000 and a 14,000-gpm low-lift electric centrifugal pump for use during high water, and a gravity drain for use during low water.

Personnel

The Indian Creek-Meredosia Lake Project which includes the Willow Creek section in Morgan and Cass Counties, Ill., was awarded to McWilliams Dredging Co. of New Orleans and Chicago. The Indian Creek section had a total length of 38,478 feet while the Willow Creek project was 22,600 feet in length. Clearing was started on June 10, 1941, and scarifying begun by the Marion dragline on June 25, with the Page Walker starting on July 7, 1941. The project required completion within 500 calendar days from the award of the contract. The two draglines were operated 24 hours a day, excluding Sundays, with three 8-hour shifts. For the contractor the work was in charge of S. A. Broussard as Superintendent.

The work was done under the direction of the U. S. Engineer Dept., Chicago District Office, Col. Charles Keller, District Engineer, with L. P. Murphy as Area Engineer in Peoria, Ill., and Henry Linson as Resident Engineer in charge.

C. & E. M. Photo

The McWilliams Dredging Co. of New Orleans and Chicago used this Marion dragline with a 2¼-yard Page bucket for levee work in the Beardstown, Ill., area.

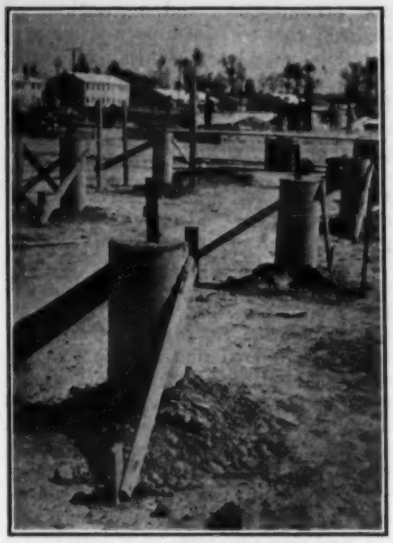
Post-War Road Plans Now Being Prepared

Engineering work, from the conception of improvements through surveys and the preparation of detailed plans and specifications ready for contractors' bids, for post-war highway construction totaling nearly $500,000,000 is now going forward as a joint Federal-State undertaking, according to Brigadier General Philip B. Fleming, Federal Works Administrator. This work is being financed from the $10,000,000 fund authorized by Congress in the Defense Highway Act of 1941 with the requirement that the states match funds for projects according to the recognized Federal-Aid plan.

Projects have been approved in California, Massachusetts, Mississippi, Missouri, New Jersey, New York, Oregon, and in the District of Columbia, with additional projects under consideration by the Public Roads Administration. Actual construction will not begin until after the war is ended. General Fleming stressed the fact that this program is only a part of the Federal-Aid highway construction and improvement program to be undertaken after the war. The projects on which the PRA and state highway department engineers are now working are aimed at the solution of major traffic problems on main routes through and around cities and on sections of highway that will form part of the proposed inter-regional highway system.

Studies made by the American Road Builders' Association indicate the economic soundness of a post-war highway program totaling many times the figure given by General Fleming. Surveys made by A.R.B.A. and a quantitative analysis of known facts indicates a minimum post-war highway program of $2,000,000,000. While being fully cognizant of the absolute necessity of devoting our entire efforts to first winning the war, the Association has nevertheless steadfastly maintained that the highway industry and profession must prepare to meet its post-war responsibility. Because of the many inherent economic advantages of highway construction, future industrial and economic stabilization will be largely affected by, and to a considerable extent dependent upon, the post-war program.

Buy a share in freedom. Invest in War Bonds and Stamps regularly.



Backfilling and simple bracing of Sonotube forms for concrete piers.

New Fibre Tubing for Concrete Pier Forms

A new type of spiral-wound laminated specially constructed fibre tubing for use as concrete pier forms in the construction of cantonment-type buildings at Army and Navy camps and bases is made by the Sonoco Products Co., Hartsville, S. C. This Sonotube comes in six standard diameters of 8, 9, 10, 11¼, 12 and 13½ inches, i. d., and in lengths up to 24 feet.

On the job the Sonotube is cut to the proper length, that is the height of the pier above the footing, by either power or hand saw, is braced in upright position, and is ready for the pour. Wax-treated, Sonotube is good for one-time use only, and is easily removed after the concrete in the piers has set. Since no critical materials are used in the production of Sonotube, it is readily available without a priority rating. It is light in weight, easily handled, and easily stripped.

Copies of a bulletin with further information on Sonotube and containing a number of illustrations showing how Sonotube is used on the job may be secured by interested contractors and engineers direct from the manufacturer by mentioning this magazine.

Roadside Planting In Arizona; Its Cost

An attractive planting of pink and white oleander and orange trees along the west side of the highway from Wickenburg through Glendale to Phoenix, Arizona, provides an effective screen for the railroad tracks about 4 feet above the grade of the concrete highway which carries heavy motor traffic. Inasmuch as this section is within the great irrigated area surrounding Phoenix, watering these plantings in the desert is not a great problem. Arrangements were made with local users of irrigation water to flood the ditch back of the oleander and orange trees whenever the nearby irrigation ditches were taking water.

Such advantageous arrangements were not possible in other sections where similar plantings of shrubs and trees were made, so large tank trucks hauled water periodically to maintain these imported plantings. Enthusiasm for this type of planting had eaten heavily into the annual budget of $40,000 for the care of roadsides throughout the state, so Arizona has "gone native" now in all its roadside plantings, on orders from W. R. Hutchins, State Highway Engineer. Since Arizona has over fifty native varieties of cacti, many of which are distinctive and range from the giant sahuaro to other tall bushy varieties and the low barrel cactus, all of which bloom at some time of the year, the choice is completely within the well-formulated ideals of roadside development—plant to improve safety and appearance and reduce, *not* increase, maintenance costs.

Arizona is careful not to endanger the lives of motorists in vehicles out of control as no heavy trunk trees are planted along roadsides. The largest now planted is the Palo Verde, a native green desert tree with no leaves but with a profusion of small yellow blossoms each spring and which thrives on practically no moisture, provided there is a constant reasonably high temperature. It is attractive in appearance and, in spite of its lack of leaves, is an excellent screen. Further, it does not grow heavy enough in the trunk to endanger the lives of motorists striking it in an automobile.

Substituting Steel Wheels for Rubber

Because of the acute rubber shortage, arc welding is being used today to give steel treads to such units as wheel tractors, trailers, and other mobile equipment formerly designed for rubber tires. The Airlite Mfg. Co., Emporium, Penna., found that wheels of the old Fordson tractor are of the right outside diameter to match that of the rubber tire with which the modern Ford tractor has been equipped. Airlite supplies adapters for the conversion of these old discarded wheels, of which there are many thousands still obtainable. There are three rigidly constructed adapters for each wheel, each composed of three heavy steel plates, electrically welded at the seams with Lincoln Fleetweld No. 7 electrodes.

State and county highway departments and contractors who are using this type of tractor in stabilization work may procure the old Fordson wheels, cut out the spokes and hub with an acetylene torch, and then electrically weld the adapters to the inside face of the old wheel rim. This makes the converted wheel ready for use and it may be interchanged with the inflated tire in a few minutes. By using an extra wheel disk or an Airlite Wheel Mount, a converted wheel may be mounted alongside the rubber tire, to prolong the life of the tire and to afford immeasurably better traction on soft ground. Two converted steel wheels may be used side by side, four on a single tractor, if desired.

Further information on this tire conversion may be secured direct from the Airlite Mfg. Co. by referring to this item, or from this magazine.

Safety on the job is vital to the Victory effort.

The Mixermobile used for mixing and delivering the concrete to the work on the retaining wall and pier.

New Bridge Approach Part of Portland Job

(*Continued from page 9*)

In constructing the retaining wall and central pier of the approach, the contractor purchased ready-mixed concrete from the Concrete Construction Co., which used Mixermobile equipment for mixing and elevating the concrete at the site. Delivery of the concrete was made at a platform on a level with the concreting operation. The contractor took it from there and distributed it to the forms, using a crew of six men with pneumatic-tired concrete buggies.

Concreting Outfit

The Mixermobile consisted of a 2-ton converted Ford truck on which was mounted a 2-yard concrete mixer with power plant and a power-operated skip for delivering the batched materials to the mixer. There was also a steel tower which could be folded down to rest on top of the rig when in transit. On the tower was a ⅔-yard bucket which dumped into a tower hopper locked on the outside at any desired height. By making three quick trips, the bucket transferred the 2 yards of one mixer batch to the hopper. While the contractor was moving this 2 yards from the hopper to the forms, the mixer was preparing the next batch. The height of the tower is normally 35 feet, but 10-foot extensions are available to raise it to a total of 65 feet so that it can serve a six-story building or other similar structure when necessary.

On this job, when it came to pouring the roadway and sidewalks over the approach, the same equipment was used without the tower, the Mixermobile being spotted on the bridge span on a level with the work.

Excavation

Practically all the excavation on this section of the improvement had been done by the general contractor, Edlefsen-Weygandt Co. of Portland, Oregon, before the approach job was started. However, about 1,800 cubic yards of excavation was necessary for the pedestrian subway, which was done by Birkemeier & Saremal, who held the contract for the west approach of the bridge. This excavation was in areas containing underground power ducts, water mains, sewers, etc., so that the excavation was done by a small clamshell bucket, in order to get between the various obstructions.

Personnel

The contract for the west approach of the Morrison Street Bridge was awarded to Birkemeier & Saremal of Portland, Oregon, for $106,582. In connection with this work Birkemeier & Saremal let four subcontracts: W. R. Grasle, the electrical installations for the bridge and pedestrian subway lighting; Portland Waterproofing Co. for membrane waterproofing, three plies of impregnated waterproofing fabric with three coatings of roofing asphalt, for the subway; Oregon Art Tiling Co. for lining the subway; Portland Tug & Barge Co., foundation piling for the west abutment and also for supporting the bridge span during reconstruction.

The Front Street Improvement is a $4,000,000 project of the Oregon State Highway Commission, of which R. H. Baldock is Chief Engineer, and G. S. Paxson, Bridge Engineer, with J. T. Skelton, as Resident Engineer. The project was started before the present materials shortage (C. & E. M., Oct. 1941, page 15), but being essential to transportation under wartime conditions, the major part of it through the downtown district is being completed at this time in its essential feaures.

New Booklets on Asphalt Design and Construction

Another in its series of Construction Specifications, known as "Specification A-5", and a timely publication entitled "Transportation Shortages Affect Asphalt Pavement Design", have recently been published by The Asphalt Institute, 801 Second Ave., New York City. "Specification A-5" is a specification adopted by the Institute covering the construction of the hot-mix type of sand-asphalt base and surface courses.

The second bulletin, Information Series No. 49, presents information on how redesign of pavement structures may be made without sacrificing the advantages inherent in normal asphalt-construction procedure. The Institute commends the flexible-pavement construction specifications developed jointly by the Army's Corps of Engineers, Civil Aeronautics Administration and the Public Roads Administration and presents them in this publication under the heading "Specifications for Constructing Mechanically Stabilized and Prime-Coated Sub-Base for Asphalt Pavements or Surface Treatments".

Copies of both or either of these booklets may be obtained without charge direct from the Institute by mentioning this item.

BREAKING THROUGH. Caterpillar D8 tractors and LaPlant-Choate trailbuilders clearing right-of-way and camp sites for the Alaska Highway. In the selection of a camp site in this area, care is taken to locate in a well-drained spot, convenient to wood suitable for fuel and providing protection against the elements. The equipment shown at work is used to remove many natural irregularities ahead of the large tractors and scrapers which handle the borrow and fill to produce the desired grade. Side ditches carry off storm water after rains or thaws.

The Alas

U. S. Enginee d E Push Pioneer Th West Canad Vild Complete Am Bu

MIDNIGHT on June shifts around the clock on th

TRADING POST. A Hudson's Bay Company store along the Alaska Highway. To such posts as this, Indians and wilderness trappers come to trade their winter's catch for essential supplies.

CHOW. At left, construction workers on the Alas pended from the tripod contains pure d camps are located so that the thick poplar growth pr assur

PONTOON BRIDGE. A pontoon bridge over a river along the Alaska Highway. Substantial loads of equipment and supplies may be moved freely over this type of bridge which can readily be dismantled and moved to advanced locations as the need arises. Top photo, removing a sand bar to deepen the river so that pontoons will float at this point.

MAIN STRE bles the main st the United State mobil

Highway

d Equipment Through the Wilderness to Burma Road

June … northland. There is no total … summer, which permits working … building the Alaska Highway.

… job file into camp for their evening meal. The bag sus- … r. Photo at right shows a contractor's camp. Such … tion against winter storms. The camp area is graded to … nage.

… is town along the … a Highway resem- … sands of towns in … e advent of auto- … roads.

TIMBER. Top photo, a sawmill, operated by a belt pulley drive from a D8 tractor, on the Alaska Highway job, where timber for use in camps and for highway structures along the job is cut and prepared. Photo at left, a La-Plant-Choate trailbuilder on a D8 places fill over a culvert of native logs. At right, a log bridge erected with timber from the nearby woods on the Alaska Highway job.

FUEL. Fuel is as important to modern construction as it is to modern warfare. Here is one of the large fuel tanks to supply equipment on the Alaska Highway job being landed from a U. S. Engineers' ferry. This ferry, which is powered by a Caterpillar D17000 marine engine, is used to transport supplies and machinery for work on the highway.

THE GRADE. Left, a stretch of road ready for the graders and scrapers which will soon shape the route into a smooth well-drained all-weather highway such as is shown on the right. Constructed through virgin timber land, the road has a surfacing designed for year-round use. Side ditches provide adequate drainage, making it usable during thaws. Notice the "turn-outs" provided to park trucks where they will not interfere with traffic.

HERE'S HOW! to Finish Concrete Faster with Whiteman MACHINES

INCREASE YOUR LABOR CAPACITY 40%

You can increase the labor capacity of your present crews 40% by equipping them with WHITEMAN machines for laying concrete slabs, indoors or out. You will produce better concrete even under adverse weather conditions. You will conserve man-hours and the slab won't "get away" from you.

On large or small areas, WHITEMAN machines permit you to use a drier mix, lay it in less time with fewer men, and still deliver denser, stronger, level concrete, at lower cost.

Here's the WHITEMAN 3-step method of placing better concrete slab faster.

Write or wire today for your nearest distributor's name—he will show you how to conserve man-hours and finish better concrete.

Step 1

SCREEDING—Experienced contractor-users report that 4 cu. yds. of low slump concrete can be handled easily in 5 minutes by the WHITEMAN Rodding Machine. A steady pull forward by the operator advances the machine while the power-operated screeds make 5-in. transverse strokes on the header boards, simultaneously leveling and compacting the mix.

Step 2

FLOATING—When your concrete slab is ready for floating, the WHITEMAN Finishing Machine will give you a perfect float finish at high speed. Simply attach the "Heavi-Duti" 12-gage steel trowels to the WHITEMAN Finishing Machine, and with these strong, broad trowels, rotating while lying flat on the surface of the concrete, you can cover 1,000 sq. ft. in as little as 15 minutes. After the "floated" slab has set sufficiently it is ready for step 3.

Step 3

FINISHING—Using the same WHITEMAN Finishing Machine, with easily attached 17-gage steel "Finishing" trowels, you can again cover 1,000 sq. ft. in as little as 15 minutes. These light, flexible and adjustable blades quickly bring up a harder, denser surface, free of voids or laitance.

Remember, ONE WHITEMAN Finishing Machine takes care of both floating and finishing, thus saving equipment as well as saving time!

Production Troubles At Aggregate Plant

Plant Designed for 4,000 Tons Daily Hits High of 1,500 Tons Because Plant Did Not Fit the Rock

✦ THIS sad tale of bad rock and crusher troubles is worth telling anonymously as it may serve as a guide to other contractors working with rock which does not break readily into usable sizes. The rock is in the intermediate group for hardness, drills easily, except that the ledges are always filled with seams in which drills may be caught and which always waste much of the force of the blasts, and the rock breaks invariably into large blocks too big for ordinary primary jaw crushers.

Drilling and Shooting

In this case the contractor used good drilling equipment and drilled as much as 24 feet of hole in an hour, getting 4 to 6 feet per detachable bit. The rock was shot with 40 per cent gelatin dynamite and broke into the characteristic large blocks. Because these were too large for the primary crusher at the plant, they were drilled and plugged as much as twice. The 2-yard shovel wasted much time in the quarry, pushing the large blocks around in a search for smaller material that it could load into the four 5-yard trucks which shuttled to the crusher. A heavy-duty tractor and bulldozer kept busy trying to open up sections for the shovel and boosting the large pieces out of the way. In spite of a good shovel, there were times when the quarry floor, filled with rock of the right size but with the larger pieces on top, was unable to produce enough rock for the crusher to work on. All the time the powder monkey and helper were kept busy, plugging the larger blocks trying to produce enough rock for the shovel.

Crushing and Screening

At the primary crusher there was a rail grizzly with 8-inch openings to bypass the fines and three men feeding the rock to the 28 x 44 jaw crusher. An airhoist was required to snake out large pieces which were wasted over the edge to keep the crusher running. The material running through the grizzly and the crushed material went to a reciprocating feeder and thence to a 60-foot belt. This carried the crushed material to two 10-inch gyratory crushers which delivered the finer material to a 40-foot belt running to a pair of smaller crushers.

The material from the last pair of crushers was taken by a 190-foot belt to a pair of double-deck shaker screens. From these came the final product which was supposed to be 1¼ and ¾-inch rock.

The Troubles

As mentioned before, the plant was designed to produce 4,000 tons of rock, with a waste of 25 per cent, but, operating 24 hours a day it has averaged 1,500 tons of usable material and a waste of 30 per cent of the gross material put through the plant. The wasted material consisted of fines which were run to one bin and hauled out to stockpiles and which eventually will be used in state highway work, so cannot be counted exactly as a total loss. One truck was kept busy hauling oversize from another bin back to the primary crusher.

Instead of there being just one point at which a correction might have been made to put the plant into pay-dirt production, there were really several. In the first place, the primary crusher was too small for the job. With rock which breaks as this rock does, a plant cannot afford to use a small primary jaw crusher. This crusher, a 28 x 44, should have been shifted to a 48 x 60 at least and then the amount of extra shooting to produce rock for the plant would have been cut to much below half. If the plant still continued to produce the same percentage of waste, then it was a question of adjustment in the gyratory crushers so that the volume of oversize was reduced. Nothing can be done about the production of fines as that is a characteristic of this rock.

It was learned that one superintendent of the plant wanted to install a larger jaw crusher but it was voted down as the nearest one, a couple of hundred miles away, would cost nearly $30,000. We visited a job in the east this past summer where a large crusher was needed for production to meet a schedule, and a 48 x 60 crusher was brought from Catalina Island, California, more than three-quarters across the United States to do the trick. Because of the failure to install a crusher that would take the size of rock resulting from economical drilling and blasting, the contractor on the job under discussion was obliged to purchase outside up to twenty cars of crushed stone a day to meet the production schedule. It does not look like good economy to us: $30,000 saved in a crusher that would do the job to meet the production of 4,000 tons daily with 25 per cent waste versus 1,690 tons in 24 hours with a 30 per cent waste, and a maximum day of 1,500 tons net, with the powder monkeys making an exceptionally large number of third blasts on the same rock to reduce it to primary-crusher size. It don't make sense, Boss!

Longer Belt Life Through Proper Care

A series of recommendations for the proper care of rubber conveyor belting has been prepared by the engineers of Robins Conveying Belt Co., Passaic, N.J., in the form of a wall card to be hung near any conveyor as a reminder. These suggestions include the proper loading of belts, the use of cushion idlers where very heavy material or large lumps are carried by the belt, the even distribution of load on the belt, and numerous other tested ways of lengthening the life of rubber belting.

A new bulletin has also been issued by Robins on its Malacca plastic rubber, which is a pure gum rubber compounded for resistance to abrasion with mechanical grindings and strengthening ingredients and dispersed with naphtha to a putty consistency. It is applied with a putty knife and rolled down with a damp roller in layers not exceeding ⅛-inch wet. It is a valuable plastic material for the maintenance of rubber-faced conveyor belts.

Complete information on Malacca plastic rubber and copies of the "Proper Care" cards will be furnished promptly to those writing direct to Robins and mentioning this item.

Novel Portable Plant For Hot-Mix Project

(*Continued from page 7*)

The mixer car carries a Cleaver-Brooks tank car heater to furnish the steam for heating the asphalt cars and also for the steam jacket for the asphalt line. Adjacent to this is a Cummins 150-hp diesel engine, which drives the rotating screen, hot elevator and pugmill. A small 2-cylinder V-type Ingersoll-Rand compressor, electrically driven, delivers high-pressure air to a storage tank to start the diesel engine. Mounted above this on a framework is the hot elevator, the rotary screen, storage bin for hot aggregate, the weigh bucket for aggregates and a second one for asphalt, and a Warren Bros. pugmill for 2-ton batches, which were mixed one full minute after the aggregate and asphalt were dumped into the pugmill at the same time. Upon completion of the mixing cycle, the batches were delivered by a 15-foot belt conveyor 30 inches wide to a truck alongside the plant. Each truck hauled three batches.

The sand for the mix was hauled 19 miles by the trucks of the Highway Construction Co. from a pit where the sand had the proper gradation naturally and it was not necessary to screen it. The rotary screen above the 15-ton hot aggregate bin on the mixing plant was used merely to remove sticks, roots, and any other coarse foreign material which might have been loaded inadvertently. If an excess of 200-mesh sand showed up upon analysis, the blower was operated at a slightly higher rate to remove it with the vapors from the drier. The sand was loaded from stockpiles by a Koehring crane with a 45-foot boom and a ¾-yard Blaw-Knox clamshell bucket.

A Spencer Turbo-Compressor driven by a Le Roi engine through a V-belt drive was mounted alongside the mixer car and used to supply air for atomizing the oil for the drier burners. In order to supply water for the tank car heater, the contractor excavated a 10 x 10-foot well 15 feet deep and sheeted it with heavy lumber. From this a CMC 10M self-priming pump with a Wisconsin motor delivered the water to the tank car heater as required.

The crew required to operate the hot-mix plant consisted of:

C. & E. M. Photo

Spreading Georgia hot mix on U. S. 17 with a Jaeger Bituminous Paver.

1 crane man
1 oiler for the crane
1 oiler for the plant
1 mixer man
1 helper at the mixer
1 burner man
2 fireman (1 day and 1 night)
2 laborers on the bins removing foreign matter
1 skilled laborer, who looked after the engines
1 plant superintendent

This plant was specially designed for Highway Construction Co. by J. McKay Spears of Washington, D. C., and was built by Mr. Spears and Sam G. Brafford, who is now Plant Superintendent for Highway Construction Co. The plant was operated an average of 11 hours per day on this work, producing about 60 tons per hour, which was all that could be handled on the road. On other projects the capacity of the plant has been as high as 100 tons per hour in average operation.

Laying the Mix

Through the cooperation of the Plant Superintendent and a judicious choice of the number of trucks hauling to the spreaders on the road, the hot mix was usually put down at 260 degrees F., which was the best working temperature for the spreaders. The hot-mix seal was placed on the road about 0.6 inch thick at the center, and feathered to ¼ inch at the edge. The first 10-foot strip was laid by a Jaeger Bituminous Paver running on four pneumatic tires. This machine operated a full day ahead of the Adnun Black Top Paver which laid down the second 10-foot strip. Considerably better work might have resulted had the two machines been kept not more than 1,000 feet apart, as this would have minimized the number of vehicles crossing the joint before the second strip was laid.

It is interesting to note that the traffic on this highway averaged 6,000 cars per

(*Concluded on next page*)

Resurfacing Coastal Highway in Georgia

(Continued from preceding page)

day, and in spite of the number of trucks which the contractor operated and the two bituminous spreaders no traffic accidents occurred. This was due to the diligence of the carefully-selected flag men, three of whom worked at each spreader.

The Jaeger Bituminous Paver was run with one man tending the hopper, into which the trucks dumped their 6-ton loads, two screed or lute men, two wing men adjusting the spreading wings of the machine, the machine operator, and a shovel man at the outside edge trimming the thin edge to a clean line. Immediately behind the spreader, an Austin-Western 7-ton tandem roller compacted the bituminous seal.

The Adnun Black Top Paver had an average speed of 20 feet per minute on this job, and a maximum speed of 30 feet per minute. The crew working with it consisted of the operator, two men continuously oiling the rear rolls, three men shoveling and one man raking along the joint, a broom man moving the excess from the strip first laid, a raker on the outside, and a foreman with the machine. Whenever the machine started to push a loaded truck, the rolls left scars in the thin seal mat. These were worked over and healed by a 3-foot lute. The strip was immediately compacted by a 7-ton Buffalo-Springfield tandem roller equipped with fiber mats to keep the rolls wet and prevent their sticking to the hot-mix seal.

Quantities and Analysis

The quantities involved in this 9.295-mile section of resurfacing of U. S. 17 south of Brunswick, Ga., were as follows:

Hot-mix plant seal (Class A patching)	3,435 tons
Hot asphalt tack coat, applied at 0.1 gallon per square yard	11,451 gallons

The analysis of the hot plant-mix seal surface is as follows:

Passing ½-inch sieve	100 per cent
Passing No. 4 sieve	60-100 per cent
Passing No. 10 sieve	20-100 per cent
Passing No. 40 sieve	10-70 per cent
Passing No. 200 sieve	0-8 per cent
Asphalt	5-9 per cent

On this job the asphalt was held close to 5.5 per cent of AC8 specification asphalt, which has a penetration from 85 to 100.

Personnel

The contract for resurfacing 56.896 miles of U. S. 17 between Darien, Ga., and the Florida state line, known as State Aid Project 1791-B(2), 1791-A(2), 1836-A(1), 1836-B(1), was awarded to W. L. Cobb Construction Co., of Decatur, Ga., for whom L. J. Scott was Superintendent on this work. The hot-mix plant was furnished and operated by Highway Construction Co., of Brunswick, Ga., for whom R. T. Hinnant was Superintendent. For the Georgia State Highway Department, the work was in charge of George Roberts as Resident Engineer.

Catalog on Welding Rods

Amsco Dieweld welding rods for salvaging dies, tools, production of composite dies and tool and die alterations are described and illustrated in Bulletin No. 742W recently issued by the American Manganese Steel Div., American Brake Shoe & Foundry Co., Chicago Heights, Ill. According to the manufacturer, Amsco Dieweld is an alloy containing chromium, molybdenum, silicon and carbon, and provides a weld metal which is air-hardening as deposited and which may be softened through proper heat treatment for machineability, and rehardened within a desirable range. The deposited metal has the combined characteristics of hardness with unusual toughness, and ability to retain keen cutting edges and resist wear and abrasion in both hot and cold work.

Copies of this bulletin, which presents data on Dieweld rod and electrode sizes, suggestions for applying Dieweld, and information on pre-heating, post-heating tool steel, and grinding, may be obtained by writing direct to the manufacturer and mentioning this item.

Buy U. S. War Bonds regularly.

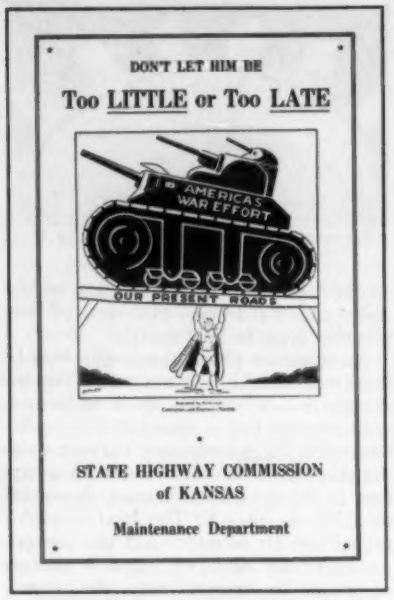
Induction Heating Cuts Hardening Time

The use of induction heating has doubled the speed at which 28-inch sprockets of heavy-duty tractors may be hardened, according to W. A. Silliman, Chief Metallurgist, Cleveland Tractor Co., Cleveland, Ohio. The Tocco machine for hardening these sprockets was designed and installed by the Ohio Crankshaft Co., Cleveland, Ohio, where the process was developed. The sprockets are used to drive the tracks of high-speed tractors which have gone into service at airports.

Previously only 6 to 8 sprockets could be hardened in an hour, but now approximately 15 may be hardened in the same length of time by the more rapid and more precise Tocco process. Each sprocket has 20 teeth and each tooth is tapered from about 1 inch in thickness at its base to about ¾ inch at the top. The problem is to harden the engaging surfaces of the teeth to stand the wear imposed by contact with the driving lugs on the tracks. While the surfaces of the teeth are hardened, the rest of the sprocket must be kept ductile.

Sprocket teeth surface-hardened by induction heating.

An operator places three sprockets in the Tocco machine at one time. The induction block contains three inductors, each surrounding a sprocket area under treatment. High-frequency current flowing through the inductors sets up a current in the sprockets, heating the metal to 1,500 degrees F. The heat is maintained for 10 seconds, and the current automatically shut off when a stream of water is turned onto the metal, quenching it for 10 seconds.



The Maintenance Department of the Kansas State Highway Commission used the Page 1 cartoon from the July, 1942, issue of CONTRACTORS AND ENGINEERS MONTHLY as a poster which was distributed to every Division, District and Section Office. Other states wishing to use our cartoons will be given permission on request.

Cotton Fabric Used For Erosion Control

Cotton fabric was used experimentally for erosion control on roadside slopes and ditches on eight test sections in Mississippi during the summer and fall of 1940. The fabric was furnished by the Division of Marketing and Marketing Agreements of the Department of Agriculture, and was installed by the Mississippi State Highway Department.

According to a report recently released in *Public Roads*, the fabric used was of the following types: S1-54, S1-40, S2-54, and S2-40, the latter figure in each designation being the width of the fabric in inches. Both types of cotton fabric have relatively large mesh openings, Style S1 having six openings per inch and Style S2 having four. Approximately equal amounts of each type of fabric were used, amounting to 15,948 square yards in the eight test sections. The table shows the amount of each type of fabric and use on each test section. The fabric was delivered in rolls. On some areas of the test sections the fabric was run horizontally; while on others it was run from top to toe of the slope, or vertically.

AMOUNT OF EACH TYPE OF COTTON FABRIC AND USE ON EACH TEST SECTION

Section No.	Amount of Cotton Fabric, Type S1 Sq.yd.	Type S2 Sq. yd.	Where Used
A	1,385	750	3:1 to 6:1 slopes; ditch bottom
B	1,500	2,250	2:1 backslopes
C	749	999	2½:1 and 4:1 backslopes; ditch bottom
D	1,361	109	2½:1 backslopes; ditch bottom
E	1,200	1,215	3:1 backslopes; ditch bottom
F	1,100	1,105	1½:1 and 2:1 backslopes
G	535	750	2:1 backslopes
H	560	500	2:1 backslopes
Total	8,270	7,678	

Section A, which is taken as typical of the installation, had sand-clay, clay and marl soil. The areas were first treated by spreading a mixture of Bermuda grass roots and topsoil to a depth of approximately 2 inches. The grass mulch was spread uniformly with shovels and rakes. The fabric was then applied and pegged down with galvanized wire staples. After passing through one growing season, there appeared to be little difference in the amount of growth on the covered and uncovered areas. The fabric-covered slope was greener and the ground somewhat more moist than was the uncovered slope. The fabric in the ditch bottom appeared definitely to have retarded erosion.

Results of Experimental Work

The results obtained on the eight experimental sections listed in the table indicate that:

1. There is no apparent advantage in using cotton on 3:1 or flatter slopes that have been treated with a mixture of grass roots and topsoil.
2. Use of cotton fabric has some advantage in shading growth and retarding erosion on 2:1 and 1½:1 slopes that have been treated with a mixture of grass roots and topsoil, or sprigged, or strip-sodded. However, straw mulch serves better and is more economical wherever available.
3. Cotton fabric aids natural growth and retards erosion on 4:1 slopes of sandy clay and clay soils that have received no other treatment. However, straw mulch serves better wherever available.
4. There is definite advantage in using fabric in roadside ditch bottoms in promoting growth and retarding erosion. The fabric should be pegged at short intervals across its width to hold it close to the ground.
5. The S2-54 fabric is more effective than the other types. The open mesh of the S2 fabric allows vegetation to grow through it, and the wider material is more economical to install per square yard.
6. For greatest effectiveness, the fabric should be placed up and down on slopes and parallel to the flow line in ditches.
7. Galvanized wire staples are more effective than wooden stakes in pegging the fabric.

Alternate Buckets Widen Deep Trench

By adding side cutters on alternate buckets, a San Francisco construction firm changed its Buckeye 120 trencher from a machine able to dig a trench 30 inches wide and 11½ feet deep to one digging a trench 60 inches wide and the same depth. This change was made necessary by the contractors signing a contract for installing exceptionally large gas pipe. The digging was through San Francisco red-rock formation at a depth averaging 7½ feet. The contractor reports entirely satisfactory digging results.

For further information regarding this method of widening trenches, write to Buckeye Traction Ditcher Co., Findlay, Ohio, and mention this item.

Safety and Salvage are vital to Victory! Save lives, save rubber, save gasoline, save scrap, save your money in War Bonds, and save the world.

Sodding 850 Acres In Very Dry Season

Special Sod Cutter Speeds Work at Southwestern Air Field: Lack of Rain Required Sprinkling Every Night

✦ BY using a special mechanical sod cutter that not only stripped the Bermuda sod from the field but also elevated it into the hauling truck, the subcontractor for the sodding of 850 acres at a new southwestern air field greatly speeded the operation. Adding to this an equally speedy method of shredding or breaking up the sod so that it could be strewn over the field enabled the operation to be completed in remarkable time.

This had its disadvantages for the contractor as the period during which the work was in progress happened to be one of unusual lack of rain so that the sod had to be wet regularly every night to save the work that had been done on the previous day and all preceeding days. There was no provision in the contract for sprinkling but that did not faze the contractor who is accustomed to seeing that a job is done in the best possible manner and with entire satisfaction to both contracting parties.

The machine used for cutting and loading the sod was designed by the contractor and has already been recognized as an outstanding contribution to sodding operations by winning a national award for such developments. The sod as cut by this machine for use at the air field was dumped into a manure spreader where it was chopped fine and scattered uniformly over the surface of the ground which had previously been disked to provide a proper bed for the roots. The scattered sod was then disked into this prepared area and fertilized at the rate of 120 pounds per acre, smoothed by a light harrow, and then rolled by a Culti-Packer.

Watering

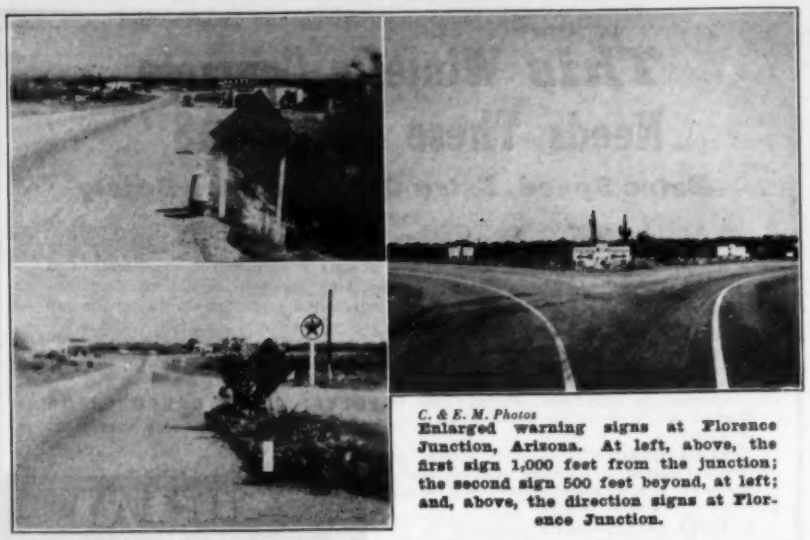
To preserve the work, it was necessary to water the entire sodded areas even though that operation had not been included in the contract. The real reason for the omission of watering was that it was not known how much water would be needed and, even though a unit price item might have been added in the contract, the total item was hard to estimate so it was omitted. Fortunately for the engineers, the contractor was of the type who is unwilling to see work which had been done according to contract go sour because a needed item was omitted, so they went ahead and did the watering, keeping careful costs so that they could be presented to the contracting engineer for approval and a negotiated contract.

Although there were several drainage ditches that had plenty of water in them which might have been used for watering with a very short haul, it was decided against using it as the water was highly turbid and the pipe sprinkler device would surely have become clogged very quickly with practically every load. Therefore, the contractor built a sprinkler and hauling truck combined by mounting two 1,500-gallon water tanks, one behind the other, on a long trailer hauled by a truck. This outfit was run regularly from late afternoon until dark into the city nearby, a round trip of about 3 miles per trip, and city water brought out for sprinkling.

The operation proved very successful as the sod showed green within three weeks of watering after the sowing. A contract satisfactory to the contractor and the contracting agency of the Army was arranged as a result of the demonstration by the contractor of his costs.

Personnel

The entire work of sodding and watering was done by contract under the direction of the U. S. Engineer Department.



C. & E. M. Photos
Enlarged warning signs at Florence Junction, Arizona. At left, above, the first sign 1,000 feet from the junction; the second sign 500 feet beyond, at left; and, above, the direction signs at Florence Junction.

New Warning Signs To Reduce Accidents

At Florence Junction, Arizona, motor traffic, now largely heavy trucks, going south from Phoenix divides, swinging right for Tucson and left for Globe. Since the turns are gradual, there seemed no reason to ascribe to poor design the accidents which occurred there. Five people were killed in four accidents within twelve months. A careful study made it clear that, although the usual warning signs had been installed at the approach to the junction, they could not be read at sufficient distance to give the driver of the vehicle ample opportunity to prepare for the turn.

Enlarged warning signs were installed, the first located 1,000 feet from the point where the routes divide and reading "Junction" in black on a yellow background 36 inches square. The second sign, 500 feet from the junction, came directly in front of a service station where it would seem inadvisable to place a warning sign because of the constant traffic in and out of the station. However, as the service station was set back a reasonable distance from the highway and the owner was cooperative, the second sign was erected directly in front of the station and reads "Slow to 35". It was highlighted, as well as protected from traffic, by a small island planted with cactus.

To complete the aids to safety and the traveler, enlarged directional signs with reflectorized letters 12 inches high were installed at the junction, giving the terminal city on each route.

What were the results of these precautions for the safety of the traveling public? For over 2 years there were no accidents at this junction and then the record was ended by a bad accident involving a single vehicle. The vehicle was a 6,000-gallon gasoline tank truck driven by a man who made the trip regularly and was consequently completely familiar with the curves at the junction. He had stopped a short distance away to pick up a soldier, then took the turn too fast, wrecked the tank truck, burned the gasoline and killed both the driver and the soldier.

This cannot be ascribed to any failure of the Arizona Highway Department to mark this junction properly and adequately to protect the drivers of motor vehicles. It is just another case of where the driver was evidently paying more attention to his passenger, this time a man, than to the road ahead.

We recall seeing on the instrument board of one of the automobiles we drove in this summer this sign which might well be a warning to all drivers, "Don't drop your glance, you may lose your pants."

Keep Freight Cars Moving

All contractors and state and county highway engineers must aid the war effort by prompt loading and unloading of rail equipment and by taking the best possible care of freight cars. ICC Commissioner J. M. Johnson has requested contractors to be especially careful in unloading both open-top and closed cars. It was pointed out that hand holds, parts of air-brake mechanism and sill steps can be damaged easily when cars are moved by trucks. Care is urged in the use of clamshell buckets while unloading open-top cars and in the use of sledge hammers and other tools to loosen wet or frozen materials, or in opening up drop-bottom and hopper doors.

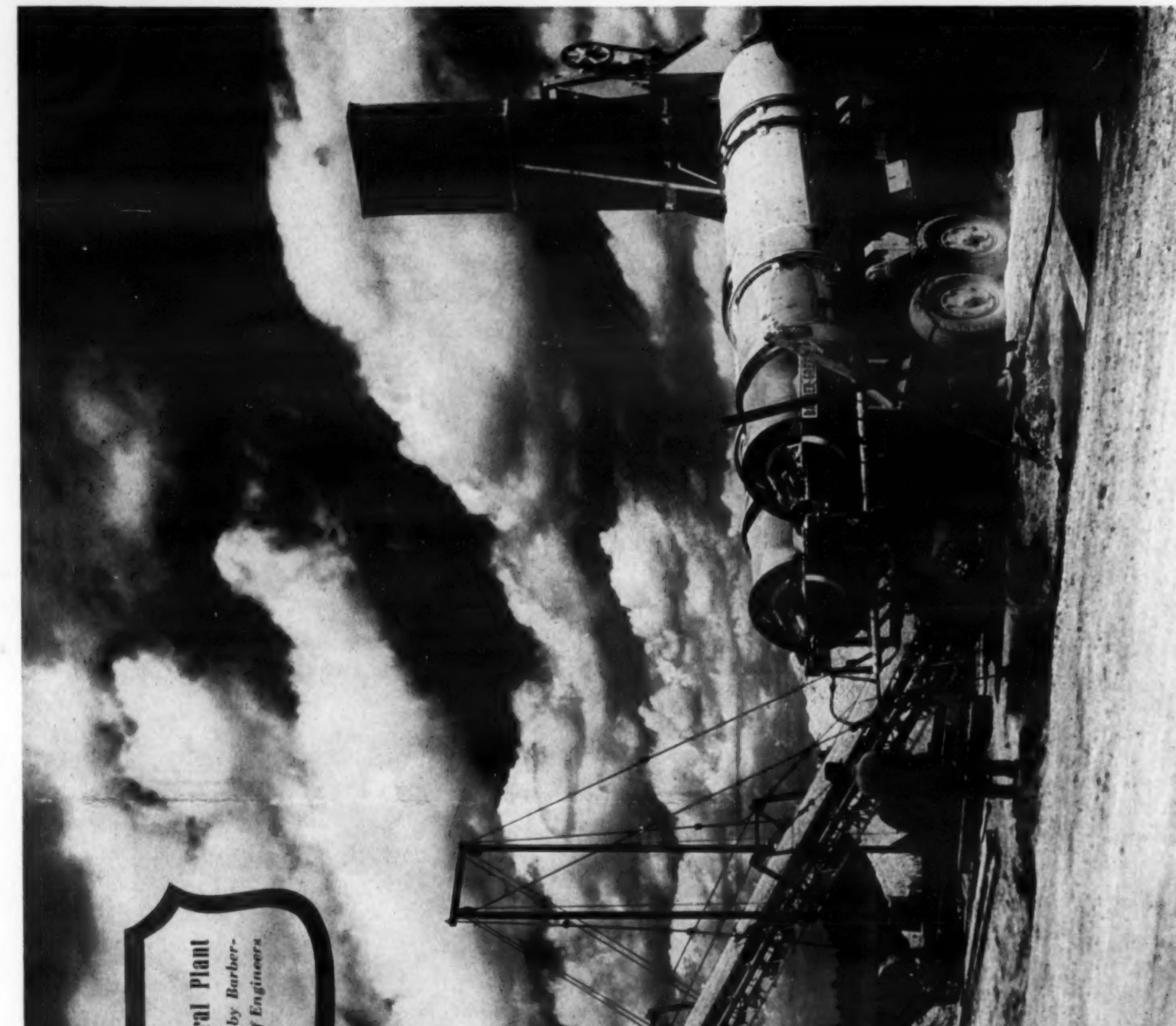
To permit the greatest possible use of rail equipment, contractors and highway departments are asked to take every possible precaution not to damage cars and to see that they are properly cleaned out and, when released, are in condition to be placed at some other point for loading immediately. The construction industry is urged to load and unload cars as quickly as possible even if it entails overtime, Sunday or holiday work.

The Associated General Contractors of America, according to H. E. Foreman, Managing Director of the Association, is cooperating with the Interstate Commerce Commission in this campaign to keep railroad rolling stock in motion through its members located in all parts of the country.

Caterpillar Sponsors Heavy Shop Company

A Corps of Engineers Heavy Shop Company, composed chiefly of skilled men from the Peoria Plant of Caterpillar Tractor Co., is now in training for active service. In command of the Shop Company is Captain Jean Walker, former Caterpillar export representative.

Caterpillar Tractor Co. is believed to be the first equipment manufacturer to respond to the call of the Corps of Engineers for an organization comprised of skilled manpower to keep the Engineers' equipment rolling. The Company consists of 199 officers and men, most of whom will become non-commissioned officers or technicians. The Shop Company volunteers left Peoria in a body with appropriate farewell ceremonies, witnessed by thousands of persons who gathered to pay tribute.



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Traffic-Line Marking In Wayne County, Mich.

The Story of Development Of Traffic Lines and the Machines to Paint Them; Present Wartime Policy

By J. L. WEHMEYER, Safety Engineer, Safety and Traffic Division, Wayne County Road Commission, Michigan

✦ THESE days, when the efficient movement of wartime traffic is of such great importance to the war effort, and when material priorities demand economy, there is no more useful tool to traffic authorities than traffic-line markings as a means of increasing the capacity of a pavement. Two lanes of vehicles often can be made to move where only one moved before or three lanes where only two moved before.

The Wayne County Road Commission of Michigan has been using traffic-line markings on its concrete pavement as a regular policy since 1920, when a white center line was painted on a bridge and a half mile of concrete pavement. This was done by means of a "snap line", a 4-inch template and a paint brush. The following year a small sled was built on which a man could ride and was hauled behind a truck. The sled had a 4-inch felt-lined slot through which the operator sprayed paint with a spray gun. The line thus made was irregular and slow to apply.

Later a small push cart mounted on wheels was built to carry a paint container, with a trigger which released paint on a brush. This method also proved unsatisfactory and only part of the county road system could be painted that year.

Special Machines Built

In 1922 a new paint machine was built, consisting of a simple dolly supporting an axle, one end of which carried a wooden wheel about 30 inches in diameter covered with felt on the rim, or circumference. The felt was 4 inches wide and 1¼ inches thick. The dolly was hauled behind a truck which carried an air compressor and paint containers. The paint was sprayed at low pressure on the felt wheel and the wheel rolled out a white line in a most efficient manner. This was the first machine that really worked. It enabled the crew to place a white line on all county roads, about 260 miles of concrete, in three weeks' time and used only 5 gallons of paint per mile. Wayne County used this machine with additional improvements to and including 1927. Its faults were considerable splashing at the start, or if the paint ran too fast, and the line had a feathery edge.

Another machine was built in 1928 in an effort to improve the appearance of the center line, which often appeared sloppy and detracted from the appearance of a new concrete pavement. Main features of this new machine were a 4-inch slot built of steel plates, which dragged on the pavement, and a spray gun to spray the paint through the slot. This simple gadget was mounted on a dolly built of two rubber-tired tractor wheels and was pulled behind a truck. Also at this time a bicycle wheel on the end of a metal frame was attached to the front of the truck to guide the driver in a straight line. This machine painted a good sharp-edged line and furnished accurate control of the amount of paint used. It applied about 5 gallons of paint per mile with an abundance of drier and enabled the truck to travel at the rate of 7 miles per hour. Wayne County uses the same style of paint machine today, with certain modifications and improvements.

Amount and Types of Paints

Application of 5 gallons of paint per mile is spreading it pretty thin but, until recent years, it was our belief that it was economical to spread the paint as thin as possible and cover as many miles of highway per day as possible. A 5-gallon line on some heavily traveled roads lasted only about three weeks and some of our roads were repainted as many as seven times in one season. Now, about 17 gallons of paint is applied per mile for a 4-inch line, which endures three to four times longer than the old 5-gallon one.

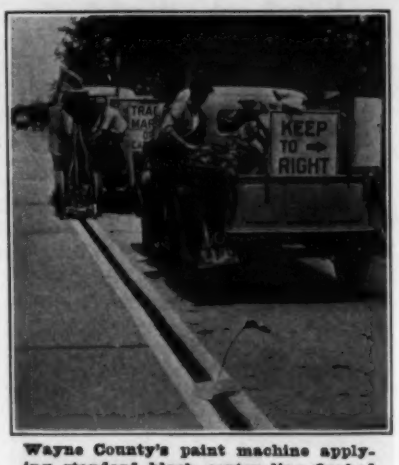
In 1941, the Road Commission adopted the use of special yellow and white paints with small glass beads which reflect the light from automobile headlights in much the same manner as a reflector-button traffic sign. These Prismo paints are extremely effective at night because they glisten in the car headlights, thus giving the same highway protection at night that they do in the daylight. This paint costs more than twice as much as ordinary paint but endures three to four times as long, due both to the better quality of paint and to the protection afforded by the beads. This beaded paint has been adopted as a standard in Wayne County and is being used exclusively for yellow and white traffic-line marking.

The paint is applied in the regular way by the paint machine but a dispenser for the glass beads had to be added behind the spray guns so that glass beads could be spread over the paint line in one continuous operation. This year the machine has been modified further so that it paints and beads three parallel lines simultaneously.

Style of Marking Used

In 1922, for the first time all concrete roads in Wayne County were painted with a white center line. Also, in that year, such wording as "No Parking on Concrete", "Railroad Crossing", etc.,

(*Concluded on page 47*)



Wayne County's paint machine applying standard black center line flanked by two yellow lines used on four-lane or wider pavement.

Indiana Seeks Funds To Maintain Roads

Faced with a serious reduction in funds due to the rationing of gasoline, while at the same time the 10,000 miles of state highways must be maintained for transportation service, the State Highway Commission of Indiana is looking to the State Legislature to provide adequate funds. Since the revenue of the State Highway Commission is obtained from motor-vehicle license fees and a gasoline tax, the reduction in mileage traveled means a corresponding reduction in funds available for highway purposes.

This condition was anticipated by the Highway Study Commission created by the 1941 General Assembly to submit recommendations on highway, road and street financing. While the final recommendations of the Study Commission have not been adopted, they are expected to oppose strongly any diversion of motor-vehicle revenue funds from the building, maintaining and operating of roads and streets. It is apparent that the General Assembly will be called upon to provide such funds as are needed for basic highway purposes.

Indiana has an investment of approximately $400,000,000 in its state highway system which must be safeguarded by adequate maintenance, according to Sam C. Hadden, Chairman, State Highway Commission, which began months ago to curtail its activities in anticipation of a reduction in funds available for road work. Construction during the past summer has been limited almost entirely to projects which had been requested as a part of the development of an adequate system of military routes.

Osgood Rates Army-Navy "E"

On October 7, 1942, the Army-Navy "E" award was presented to the employees of The Osgood Co., Marion, Ohio. A feature of the ceremony was the souvenir program, a personalized copy of which, autographed by M. C. McNeil, President of the Company, was presented to each employee just before the ceremony. On the inside of the cover page an individual photograph of the recipient was mounted.

The entire program was directed to the employees who earned the award, with little thought or attention being given to outside interests.

New Plans To Reduce Wire Rope Varieties

A proposed Simplified Practice Recommendation for wire rope has recently been submitted for approval or comment to producers, distributors, users, and others interested by the Division of Simplified Practice, National Bureau of Standards, Washington, D. C. This recommendation, which includes sizes, constructions, grades and breaking strengths of the vast majority of tonnage of wire rope, is based on an exhaustive review of existing published standards of the industry. The recommendation is designed to conserve strategic materials and available productive capacity for the war program, and at the same time care for important consumer requirements adequately.

General adherence to the twenty tables included in this recommendation will result in a net reduction in variety from 973 items to 643, or 33.9 per cent. The major production and use of wire rope, and therefore the predominant tonnage, is covered by four different rope constructions, where the reduction in variety is from 352 items to 182, or 48 per cent.

The proposed recommendation was developed by the Contact Committee of the Wire Rope and Strand Manufacturers Association and submitted for passage through the regular procedure of the Division of Simplified Practice, National Bureau of Standards, at the request of the Wire and Wire Products Section, Iron and Steel Branch of the War Production Board.

Distributors and users of wire rope who are desirous of aiding the war program by conforming with this important conservation measure are invited to write to the Division of Simplified Practice, National Bureau of Standards, Washington, D. C., for mimeographed copies of the proposed Simplified Practice Recommendation.

Have you instituted the Payroll Savings Plan for the regular purchase of War Bonds in your organization? If not, do it now!

Proper Truck Care To Keep 'Em Rolling

(Continued from page 16)

checked to make sure that it is functioning. This device conserves fuel by hastening the warming up of the engine. It should not be neglected, particularly under present conditions, and if not functioning properly it should be either replaced or repaired.

Correct carburetion is the key to fuel economy. The carburetor, however, is a delicate instrument, and it is safe to say that in a majority of cases, engine trouble that is first diagnosed by the average operator as faulty carburetion can be traced to some other source. As a general rule it is best to check ignition, compression and all other factors affecting engine operation before tampering with the carburetor. But if the engine does not idle smoothly and the ignition appears to be in good condition, valve clearance uniform, compression good, and manipulation of the idle adjustment on the carburetor does not result in smooth performance, then it is time to consult a service man qualified on carburetors.

Valves Should Be Checked

Uniform and proper valve clearances are tremendously important to fuel economy. If engine power appears to be reduced, use of a compression gage may show that the valves are not seating right or that the piston rings are worn. Low compression indicates that the engine should be opened and the necessary repairs made. When the engine is not functioning normally, the sooner the valves are repaired the better. This usually will save replacements.

Oil too is precious now and should not be wasted as it will be if the piston rings are worn. When this condition exists, oil is not only wasted but the truck owner risks running out of engine oil and damaging other parts of the power plant.

Careless operation or "riding" the clutch pedal will shorten the life of this unit considerably. A certain amount of free play or movement of the clutch pedal is necessary to compensate for wear of the clutch facing and to avoid slippage.

Truck operators should be constantly on the alert for any unusual noises in the transmission, rear axle or in universal joints. Immediate inspection to determine the causes of these unusual noises generally will prevent damage to the units that may result later in costly repair bills.

Correct Engine Temperature

An efficient cooling system will maintain a temperature of about 150 degrees F. in the truck engine, which insures full economy of operation, and which minimizes the formation of water and acid vapors in the crankcase. When anti-freeze solution is used, it is important to check the water pump, hose connections and the cylinder head to make sure there are no leaks. If anti-freeze leaks into the engine it will contaminate the oil, cause sticky piston rings and most likely damage other engine parts.

Other Items for Care

Brakes that are in proper adjustment, with facings in good condition, not only assure adequate braking force to help prevent damage to the truck and its cargo through accidents but help to prevent uneven and unnecessary wear that may require expensive repairs or needless tire wear.

Wheel bearings properly adjusted and lubricated to handle the load hauled by the truck will contribute to longer life for these units, facilitate the performance of the brakes and avoid abnormal wear.

One of the greatest factors in prolonging the life of tires is to make sure that they are properly inflated. Inflation pressures should be checked at least once a week, and under current conditions the wise operator will check inflation every day. Immediate attention to tire injuries will avoid progressive damage. All tires, including spares, should be rotated regularly. When dual rear tires are used they should be of uniform size to insure each carrying an equal share of the weight and thus prevent undue wear on any one of the tires. Correct wheel alignment and balance will prevent uneven or spotty wear such as tire "cupping" and "scuffing."

With proper care the modern motor truck is capable of standing up in hard service for many years, earning money and saving money for its owner every day that it operates. Neglect breeds trouble and expense, and leads to the untimely end of a truck that under present conditions may not be replaceable. Until we have won the war, metals, rubber and other materials must be used first in the production of guns, ships, planes, and tanks, which means that present truck equipment must shoulder the burden of highway transport with only a very thin line of reinforcement.

This article has been made available to readers of CONTRACTORS AND ENGINEERS MONTHLY through the courtesy of the Dodge Division, Chrysler Corp., Detroit, Mich.

Dial Scales for Speed

A new illustrated bulletin on Kron dial scales for service in industry, with special attention to their service for suspension hoppers in permanent or portable batching plants for concrete or asphalt plants, has recently been issued by The Kron Co., Bridgeport, Conn. Copies of this 16-page condensed Catalog No. 8-426 will be sent promptly on request to the company.

Pile Bearing Low In Old River Bed

Bridge Under Construction South of Hartington, Nebr., Required Loading of Piles To Check Pile Formula

✦ HIGHWAY 15 of the Nebraska state system runs south from the Missouri River bridge at Yankton, S. D., and 22 miles south was relocated between Hartington and Laurel during the late construction season of 1941. The new route is through an old river bottom, with long fills, and required seven bridges varying from 60 to 120 feet in length. These were all concrete slab structures on creosoted pile bents. Unusual conditions of pile bearing were found at all structures, as the required bearing of 18 tons was not developed according to the standard pile formula. This was unexpected, because the borings at the sites were favorable to the development of adequate bearing.

Borings at Bridge 4(6)-3

The usual borings were made at the site of the bridge to determine the character of the subsoil and also the elevation of the water table. The borings taken at this bridge were all practically uniform, and are typified by the log of the boring at Hole No. 1. The figures at the left show the individual thickness of the stratum, and those at the right of the soil definition are the accumulated depths:

The water table was found to be 8 feet below the surface of the ground.

6 feet	dark soil	6 feet
9 feet	yellow clay	15 feet
8 feet	blue clay	23 feet
5 feet	coarse sand and gravel	28 feet
22 feet	solid yellow clay	50 feet

Pile Bearing and Test

The contractor was expected to furnish piling to develop the full design bearing of 18 tons, with a penetration of not less than 28 feet. The first pile driven went to 30.9 feet below the cut-off elevation and developed only 8.91 tons, according to the standard pile-bearing formula. Nebraska specifications provide that all piling shall be driven to at least the minimum penetration shown in the plans and until they develop the required bearing capacity or to "practical refusal". Under these conditions the contractor could have driven a longer pile, or, as he chose, load one pile in any group of one hundred to 1½ times the specified bearing, to test its settlement.

The pile was loaded for 24 hours. The initial loading of 1.28 tons, which included the loading platform as set on the top of the pile, took three hours to set in place, and the pile showed no settlement with this loading. Then three men loaded 125-pound sacks of gravel, reaching the maximum loading of 27 tons at 4:15 p. m. The work had been started at 1:30 p.m. When the maximum loading had been reached, and held up to 24 hours, the total settlement was only 5/16-inch with the load; and on removal of the load, the permanent settlement was 3/16-inch. As the specifications require a maximum settlement of not more than ¼-inch, this test loading of the creosoted pile made all of the piles in that structure acceptable for 18-tons bearing capacity each.

Discussion

The pile which was tested had been driven by a 3,020-pound drop hammer, manipulated by a dragline. A study of the boring log shows that most of the driving was through clay and below ground-water level. It is entirely possible that the driving so disturbed the clay at the point of contact between the creosoted pile and the clay soil that a certain amount of lubrication was created because of the presence of ground water. Upon being allowed to set for the period of the test, the ground water returned to normal between the pile and the soil and skin friction developed sufficiently to give a maximum permanent settlement of only 3/16 inch when the test load of 27 tons was removed.

Personnel

This bridge, No. 4(6)-3, was one of a series built by W. A. Biba Engineering Co., of Geneva, Nebr., for whom Vincent Kozial was Superintendent on this work. For the Nebraska Department of Roads and Irrigation, the work was in charge of J. M. Calder, Jr., as Project Engineer.

Five Suggestions For Care of Tractors

The second issue of *Cletrac Facts* features five practical suggestions for maintaining Cletrac tractors, made by the Cleveland Tractor Co., Cleveland, Ohio, in productive service during wartime. One suggestion explains how worn lower track-wheel shafts can be restored in approximately three hours by building them up through welding and then grinding them down to their original diameter.

Another item describes the methods used to rebuild Model F grousers by cutting, and then welding lengths of stock to the worn grousers. A third illustrates how diesel-tractor lower track wheels worn to a taper can be built up with from 3 to 5 pounds of electrode and then the face ground down to the proper size. The fourth and fifth suggestions concern methods of rehabilitating FD lower track wheels by restoring the bead on the wheels, using a home-made support to speed up the work, and how drive sprockets can be built up to their original contour.

Copies of *Cletrac Facts* may be secured by writing to the Cleveland Tractor Co., and mentioning this item.

Choose your bonds—the bonds of defeat and tyranny, of concentration camps and slave labor; or War Bonds for Victory and Freedom.

1942 Winter Trials In Road Maintenance

The maintenance of the Indiana state highway system during the winter months, in order to assure the continuous movement of military and essential civilian traffic, is being given particular study, according to S. C. Hadden, Chairman of the State Highway Commission. He calls attention to the fact that experienced operators are required to handle the heavy trucks on which snow plows are mounted to buck through drifts and to handle the graders and other equipment used to clear ice from the pavements and to spread sand or cinders on slippery grades and curves. Many of the men who have operated this equipment in recent years have been lost to the armed forces and to war industries, so that new workers must be trained.

Preparation for winter maintenance in Indiana has been in progress for some time in each of the thirty-six highway sub-districts. Trucks and other equipment have been checked and placed in good operating condition; sand and cinder stockpiles have been located at strategic points; side ditches have been cleaned to improve drainage; and cracks in the pavement have been filled during the summer months to prevent damage to the pavements during the months of freezing and thawing.

Indiana state highway workers have established a record of open roads during emergencies in past winters and aim to maintain that record this year.

Vest-Pocket Catalog Of Quarry Equipment

A new 42-page vest-pocket booklet containing 72 illustrations and numerous data on rock drills, detachable bits, reconditioning equipment, hose lines, hoists, pumps, and air compressors, written in non-technical language has been published by Ingersoll-Rand Co., 11 Broadway, New York City. The booklet contains many hints that may save time and labor on rock jobs.

Free copies of the booklet, Form 2724-C, may be obtained from Ingersoll-Rand direct by mentioning this review.

Wartime Practices In Highway Design

The second, third and fourth bulletins on "Wartime Road Problems" being prepared by qualified committees of the Highway Research Board have recently been released. Bulletin No. 1 covered the curing of concrete pavement under wartime restrictions on critical materials, while the three new bulletins are devoted to: No. 2, "Design of Highway Guards"; No. 3, "Design of Concrete Pavements Requiring a Minimum of Steel"; and No. 4, "Maintenance Methods for Preventing and Correcting the Pumping Action of Concrete Pavement Slabs."

The Board also has in preparation bulletins on road stabilization and the compaction of soil. Copies of these bulletins may be secured direct from the Highway Research Board, 2101 Constitution Ave., Washington, D.C.

Thomas, Chain Belt, Now a $1-a-Year Man

A. W. Thomas, Sales Manager, Construction Machinery Division, Chain Belt Co., Milwaukee, Wis., has been appointed consultant for the Construction Machinery Division of the War Production Board, Washington, D. C., as a "Dollar-a-Year Man". Mr. Thomas is a graduate of Purdue University in civil engineering and has been with Chain Belt Co. for fifteen years, serving on both the engineering and sales staffs.

During his absence, Mr. Thomas's duties will be taken over by D. A. Kalton, Assistant Sales Manager of the Construction Machinery Division.

The military needs for rubber are tremendous. The eight tires on a 4.7-inch motorized anti-aircraft gun use 2,240 pounds of crude rubber, enough for 45 ordinary passenger-car tires. Stretching the life of tires now in use is the easiest way of combating our rubber shortage. Use your tires carefully.

Road Discussions On Route to Taos

Notes on New Mexico Roads As to Care, Improvements And Roadside Parking

✦ AS one drives some distance to inspect new construction or maintenance operations with a member of the engineering staff of a state highway department, there are bound to be many topics discussed as various improvements are noted along the highway. These notes are the result of an inspection tour with Charles M. Johnstone, Maintenance Engineer, New Mexico State Highway Department, which brought out material for other articles on maintenance methods and savings. The highway over which we were driving leads north from Santa Fe and then eastward toward Taos.

About 60 per cent of the normal driving over New Mexico highways is business and truck traffic, when averaged throughout the year. This means that a considerable portion of the loss in gas-tax income is going to be from tourist travel which made up most of the remaining 40 per cent.

U. S. 64-84 is a heavy traveled road. It started out as a 20-foot oil mat which has been reconstructed to a 34-foot roadway by heavy maintenance operations and sealed with asphalt and ¾-inch stone chips which really is a double penetration surface costing about $2,000 a mile. This is a mere pittance compared to what Coronado was seeking in the seven cities of fabulous riches paved with gold. An oil-mix curb is used along the fills to retain the water and allow it to flow off at prepared outlets or run-downs so as not to erode the fill slopes.

This highway is known severally as the "Coronado Trail" and "Kit Carson Highway", the names being used simply to interest the traveler who naturally depends on the Federal highway numbers to guide him to his destination. Coronado was supposed to have come through the pass over which the highway goes on its way to Taos. Kit Carson, noted frontier guide, made his headquarters in Taos where his home is still standing.

Markers and Parking Areas

A few miles north of Santa Fe there is a natural monument of interest to all travelers. Wind and rain have eroded the soft stone so as to form a very creditable likeness to a camel sleeping on the ground. So many cars stopped to look at this specimen of Nature's carving that traffic was slowed up considerably and a danger spot created. When the road was widened, the maintenance department very wisely made a gravel turnout here with creosoted timber stops to limit the parking area and stepping stones leading toward the camel.

Throughout New Mexico, in order to interest the tourist, there are artistic wooden signs informing the traveler that 1 mile ahead is a historical marker. These are uniform in character to acquaint the driver with their nature so that he slows up in the mile ahead if he is interested in the history of this territory.

The highway runs along the banks of the Rio Grande for many miles and there are numerous small parking areas which at times of good fishing, when the river is clear, are filled with the cars of ardent fishermen from many states. The river is actually open for fishing 365 days a year. The canyon of the Rio Grande, seen from the pass as one looks toward Taos, closely resembles the Grand Canyon of the Colorado, but in miniature. The old road went up the canyon floor, then branched with many switchbacks to reach the rims. One road led to Taos and the other north to Colorado.

Old guard-rail posts, showing the notches where the rails were attached, are used now to define the location of small culverts and, also with reflector buttons in them, to define the outer side of all curves that are not visible from at least 1,000 feet.

Erosion Control

On highway U. S. 64-84 leading north from Santa Fe, the shoulder slopes are 10 to 1 with the backslopes varying from 4 to 1, or 6 to 1 in shallow cuts. In the ditches, which erode very quickly because of the character of the soil and the intensity of the precipitation when it does rain, checks are installed. Many of these on the older roads are of galvanized wire which works to perfection but on the newer installations concrete ditch checks have been used as they look much better. No more "g.i." ditch checks for the duration anyway, even though they are good for 15 years.

Much study has been made of plantings to check erosion on the bare cut slopes. Many have been seeded with sweet clover and western wild wheat which have proved very successful. Other roadside plantings of shrubs and small trees for interest value, as well as erosion control, have had to be protected by putting a wire fence in front of them, shutting them off from the roadway because the Mexican population let their cattle run onto the roads at night, in spite of laws forbidding it, and the cattle destroy the planting in short order.

On slopes of 1½ to 1 and 2 to 1 only natural ground cover is used and that is not planted. It was expected that by saving the topsoil in cuts and then spreading it over the barren exposed soil a quick establishment of ground cover would result. Observations over a period of time, however, have shown that the natural ground cover in this section will establish itself just as soon on the barren ground as when the topsoil is saved and spread over it. The first vegetation to show is the Russian thistle which is very good in holding the ground against washing and lasts for two or three years until it is crowded out by other more permanent ground cover.

Remember—proper maintenance and regular lubrication will keep your machines working longer and more effectively for Victory!

A Mobile Concrete Plant

The most recent catalog of the Mixermobile Co., Inc., 608 S. Hill St., Los Angeles, Calif., describes the Mixermobile, a complete concrete mixing plant which may be moved rapidly from job to job, and which is equipped with a 30-foot tower which can be extended in height by 10-foot sections. This piece of construction equipment has been used on many jobs for pouring overpasses, viaducts, bridges, warehouses and other similar work.

Copies of this latest 16-page illustrated catalog may be secured free on request by writing to the company and mentioning this item.

The Cuscatlan Bridge over the Lempa River in El Salvador, C. A.

Lempa River Bridge Opened in Salvador

A new vital link in the direct route of the Inter-American Highway, Puente Cuscatlan, a 1,350-foot suspension-type bridge spanning the Lempa River in the Republic of El Salvador, Central America, was formally opened on June 6, 1942. Construction of the bridge by a United States steel construction company was begun in March, 1940, and the entire cost of the bridge, $700,000, was paid by El Salvador without outside assistance. The last cash payment was made in February, 1941, eleven months after signing the contract for the construction of the bridge, and a year and a quarter before the finished bridge was delivered to the Salvadoran government.

The new bridge is of the open-cable suspension type with unloaded back stays carried into tunnel anchorages deep in the tipitate formation. The suspended span is 820 feet between towers, with 265-foot back stays. The stiffening truss has a depth of 11 feet 6 inches, and carries a roadway approximately 20 feet wide between curbs, with 5-foot sidewalks on each side. The towers are 120 feet 2 inches above bearings, and the approach spans consist of heavy pony trusses 130 feet long on the west end and 93 feet long on the east end with concrete-beam span approaches against the steep shore slopes. The west concrete approach is of three spans with a total length of 130 feet, while the east approach has four spans with a total length of 170 feet.

An outstanding feature of the bridge is that the main span is suspended from 32 galvanized-steel bridge strands, 16 on each side, instead of two or more large cables. Each strand is 1 15/16 inches in diameter. This suspended span is one of the world's largest bridges using cable strands. Any longer span would require cables to be made of individual wires spun at the site of the bridge, as is customary on the long suspension bridges in this country.

Accidents Reduced On Delineated Roads

G. Donald Kennedy, State Highway Commissioner of Michigan, recently reported in *Michigan Roads and Construction* the results of a 4-year accident survey of heavily traveled Michigan trunklines on which roadside delineators or reflector units have been installed. Commissioner Kennedy stated, "Faced with the fact that night-time conditions are more than four times as hazardous as those experienced in daylight hours, the Department has pioneered in the use of several safety devices, including the roadside delineators and, more lately, glass bead paint".

Deaths and injury accidents at night have dropped from 2.071 to 1.270 per million vehicle-miles, while day accidents fell off only 0.086 on the Detroit-Lansing highway, U. S. 16, one of the roads surveyed for two years before and after the delineators were installed. This represents a 25 per cent decrease in night accidents, after taking into consideration a general accident reduction due to other causes.

On the portion of the Pontiac-Toledo highway, U. S. 24, where the delineators are in use, the night accident rate dropped from 2.618 to 1.892, as compared with a day rate decrease of 0.494 to 0.448, a 20 per cent cut in night accidents with the overall reduction taken into account.

According to Commissioner Kennedy, "Tests on Michigan's highways reveal that reflectors allow the driver to see the roadway as much as a mile ahead, in addition to reducing the blinding effect of undimmed headlights on approaching vehicles and making the driver more at ease and confident of his position on the highway." The delineators used in Michigan contain reflectors of non-shatterable Lucite with many facets and are installed at intervals of 100 feet along the highway. They are placed in a metal housing atop a 3-foot post, 8 feet from the pavement edge in rural areas and 4 feet in urban areas where the road surface is bordered by a curb.

A program for the installation of the delineators, including virtually all of the state trunklines and based on the accident rate prevalent on each highway, has been set up but it is doubtful if this program can be resumed until after the war.

Last year in the United States, the Salvation Army furnished 648,681 Thanksgiving and Christmas meals and supplied 336,190 children with toys and warm clothing. Remember the Salvation Army in your Christmas giving this year.

C. & E. M. Photo
J. F. Harrison, Junior Resident Engineer for the Texas Highway Dept. on the Southern Contracting Co. job on U. S. 80 and, at right, E. C. Woodward, District Engineer, District 2.

Retread Rejuvenates U. S. Route in Texas

(*Continued from page 21*)

center of the road. This folded up the asphalt and the stone and effectively started the mixing. On the return trip the first blade moved the top of the material to within 2 feet of the side of the road and the second picked up the remainder and moved that over. On the third run of the initial mixing, both graders dropped their blades slightly to pick up as much of the loose material on the surface as possible. This showed up the low and high spots of the old grade, the high spots showing black, and the low white, where the stone had not been picked up and incorporated in the mix.

At this point two men with straightened hoes scraped the surface of the road wherever there were white spots showing. Thus the uncoated stone was picked up on the next rounds of the graders and fully mixed with the other material, instead of leaving unmixed material on the surface to remain unbonded and hence cause shoving as soon as the road was placed in service.

The rougher the old road, the more times it was necessary to blade to get the material fully mixed, but eight times was the average. In case of rain, the material was immediately windrowed at the side of the road and left until the rain ceased. It was possible usually to go back the day after the rain and continue mixing as the heat of the summer quickly dried out the small amount of moisture that might have penetrated into the windrow.

The second application of asphalt was mixed in the same manner and showed a complete coverage of the surface of the stone almost immediately.

Attention to Details

When the second application was completely mixed, the material was spread with the blade square with the road and carried out to the edge. In this operation, high crown can be removed and a better cross section secured. As soon as the mix was spread, one of the blades was equipped with a small shoe at one end which was run down the edge, packing and cutting the edge to a smooth clean line. The section was then rolled by 5-ton 3-wheel rollers. The contractor on this section used a Wehr and a Buffalo-Springfield.

The use of the shoe to cut and pack the edge is a small thing but it prevented the wasting of a considerable quantity of the material per mile and left a neater, stronger edge that will not ravel soon. Another detail that should be mentioned particularly is the rather mundane operation of the two men with the straightened hoes. They scraped away all day and made the job look messier as they went along, digging out the low spots. They did what they were told and the inspector watched them like a hawk, for he knows the importance of this one operation. It can break the job completely if not done thoroughly. If the material is not loosened and the holes filled with material that is thoroughly coated with bitumen, then the retread surface will not bond with the base and hence it will shove under traffic. That is exactly what is the matter with a lot of our old retread work; it shoved and we did not know why. It was simply that we did not pay sufficient attention to the bonding of the material at the bottom of the layer with the old road surface.

Personnel

The work described on U. S. 80 near Fort Worth, Texas, was done by the Southern Contracting Co. of Fort Worth, Texas, with Oran Warnock as Superintendent. For the State Highway Department, the work was in charge of J. F. Harrison, Junior Resident Engineer, under the direction of E. C. Woodward, District Engineer, District 2. The work was a maintenance-construction contract. D. C. Greer is State Highway Engineer.

Dry Grading Story Has Mixed Metaphors

A Dry Spring Followed by Hot Weather and No Rain for Month Makes Grading a Problem in Indiana

+ WHEN a triplex road pump has to be installed to wet the grade so that scrapers and tractors can operate, it's a case of "man bites dog." Just this actually happened on the grading on FAP 6C (4) for two 22-foot dual-lane reinforced-concrete pavements between Manhattan and Putnamville, Indiana. R. McCalman, Inc., had the contract just east of this project and completed grading in the late spring while there was still some moisture in the ground. When they hit this job with the grading outfit, the cat skinners were literally smothered in dust and so obscured that collisions were imminent. It was for this reason that the spare C. H. & E. triplex pump was taken off the paving job and sent ahead to make it possible to wet down the grade, using the usual line of pipe laid along the shoulder.

It was possible to spot this job from miles around by the tower of dust which hung in the air above the area where the scrapers were operating. When it came time to drive over the work, an automobile going at 10 miles an hour looked like a speed boat in front and behind left an impenetrable dust screen. It is just impossible to operate a job under these conditions but with a judicious amount of water applied to the grade to hold down most of the dust it was possible to complete the grading in ample time for the paving outfit to move east from its first job and complete pouring the second within the specified contract time.

Welding Electrode For A-C Machines

A new electrode for all-position use with alternating-current-type welding machines, and complying with all requirements of the American Welding Society Classification E6011, American Bureau of Shipping, Group H1G and B1G for alternating current, has been developed by Air Reduction Sales Co., 60 E. 42nd St., New York City. The Airco No. 230 electrode, made in diameters of 1/8 and 5/32-inch, has given very satisfactory results in its physical tests. It is reported that the high quality of deposited metal is fully comparable to that of the best direct-current reverse-polarity all-position electrodes.

Another characteristic of this alternating-current electrode is that average operators have had no difficulty in securing good fusion and complete penetration. The finished weld deposit is quite smooth and has a uniform surface color.

Complete information and prices of this new electrode may be secured direct from Airco by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Get in the scrap! Steel production for the Victory effort can not be maintained at the necessary peak unless every bit of idle scrap metal is turned in. Half the metal in every ship, every tank, every gun is scrap. Look through your shops and yards again. Get together all your scrap and start it on its way to Berlin and Tokyo now!

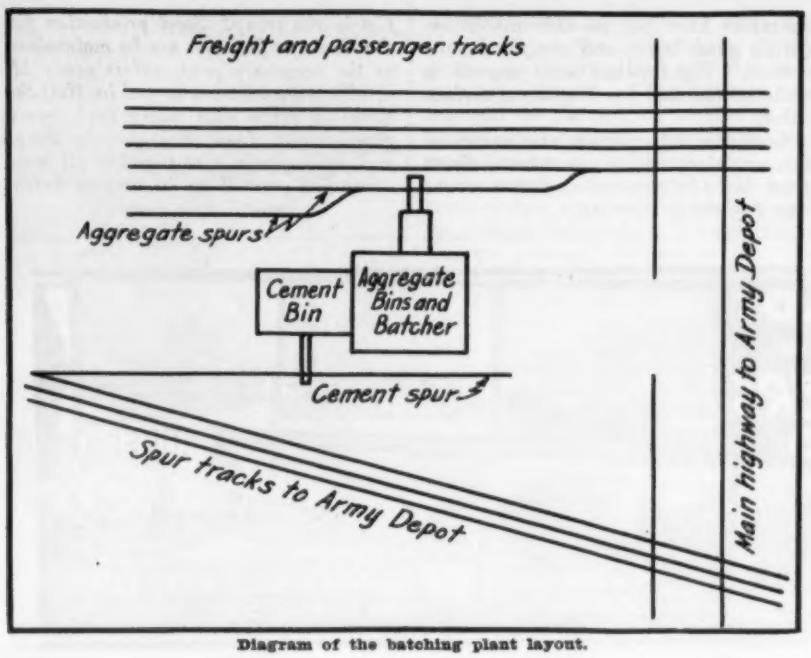


Diagram of the batching plant layout.

Concrete Batching For Army Depot Jobs

(*Continued from page* 1)

Batching

The aggregate consisted of a graded gravel meeting Army specifications from 1¼-inch down, and sand. A second ¾-inch uniform gravel was stored in one of the four top bins for providing special mixes as required. The Erie AggreMeter plant was operated by one man at the batching platform. The control of the flow from the aggregate bins was entirely by hand levers, with Kron scales to indicate the weights. The cement was controlled automatically while the water was measured by a 2-inch Neptune meter with hand control for shut-off. Considerable trouble was experienced with low water pressures as the plant was located in the midst of high-use war plants.

The plant was operated from 11 to 12 hours daily, turning out the dry batches and supplying the 2½-yard truck mixers with their batches. The batch weights for truck mixers were as follows:

For Reservoir Construction:	
Gravel, 1¼-inch down	2,073 pounds
Sand	1,171 pounds
Cement	564 pounds
Water	26⅔ gallons
For Warehouse Construction:	
Gravel, 1¼-inch down	1,950 pounds
Sand	1,300 pounds
Cement	508 pounds
Water	30 gallons

(This concrete was used for footings, beams, walls and floors)

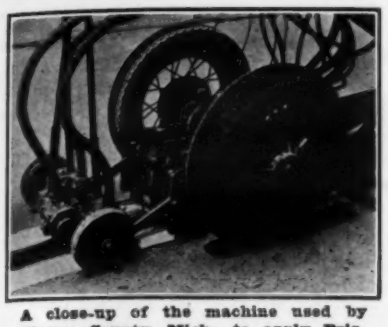
The Truck-Mixer Fleet

The batching contractor provided concrete for several subcontractors within the Army Depot so that it was necessary to maintain a large fleet of truck mixers. He used a total of ten 2½-yard Jaeger high-lift truck mixers mounted on GMC and White trucks for this service. They had hauls varying from about ¼ mile to 1 mile for the longest haul from the batching plant to various points at the Depot where the concrete was delivered to the forms.

Personnel

The contractor operated the plant from 7 a.m. to 6:30 p.m. to care for the varying requirements of the other subcontractors. On the operating floor of the plant were a repair bench for minor adjustments, and an office. The design of the plant layout was the result of the experience of the Plant Superintendent who has been with the contractor for many years.

In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.



A close-up of the machine used by Wayne County, Mich., to apply Prismo traffic-line paint.

Traffic-Line Marking Revised for Duration

(*Continued from page* 37)

was painted on the highways. In Michigan, many cities still use a multitude of markings, more or less effective, but in recent years the State Highway Department has endeavored to standardize the practices that have been developed throughout the nation and eliminate those which were found to be ineffective. The County Road Commission has cooperated with and followed the recommendations of the State in this respect.

The Wayne County Road Commission and the Michigan State Highway Department have adopted the 4-inch black paint line as standard center-line marking for 20-foot concrete pavements, and a 4-inch white line for 20-foot black-top surfaces. On four-lane, or wider, pavements a 4-inch yellow line is painted on each side of the black center line, making a center line 12 inches wide in all. The black paint used was Jennite No. J-16 tar emulsion to which was added 40 per cent of water to reduce slipperiness and to produce a consistency which could be used in the spray machine. The Road Commission paint machine leaves a space of approximately 1 inch between these lines, so that the center line is actually nearly 14 inches overall in width.

Within municipalities where there is business frontage along the highway and parking, the Road Commission uses a single white center line because there is considerable turning around and crossing of the center line by cars, and the yellow lines in Michigan are reserved for "no passing" zones.

A yellow line is painted on the right side of the center line on 20-foot pavements in no-passing zones, on curves and hills, and for a distance of 300 feet on the approach to all signalized and certain stop intersections.

Besides the center-line marking described, crosswalk lines, two lines, are painted for school crossings, both rural and urban. At certain busy intersections with multi-lane pavements, traffic lanes are marked in yellow broken lines for about 300 feet in advance of the intersection to insure the maximum number of lanes being used. Laning also is done at irregular spots in the roadway where traffic, left to its own judgment, would move in only one and two lanes instead of in the two, three or four lanes that are available. Occasionally, speed limits or "stop" are painted on the pavement where a new limit or new stop intersection has recently been established.

Changes Due to the War

Because of priorities on certain types of paint, the necessity for economy in the use of road funds and the possibility of blackouts, Wayne County has temporarily abandoned the use of black paint for center lines on concrete pavement and the use of double yellow lines on all but a few wide pavements. Yellow beaded paint will continue to be used for lane lines and for no-passing zones.

This plan saves considerable yellow paint that normally would be used on some wide pavements. The beaded paints are found to be very effective with the blackout headlights approved by the War Department for both emergency and private vehicles.

Highway Dept. Shops Aid Army in Arizona

(*Continued from page* 2)

operation and care of automotive equipment is given to likely candidates for motor transport work in the Division.

Interviews by Superintendent

George E. Steisel, Superintendent of Equipment of the Arizona Highway Department, has been designated as a review official to interview applicants for work in the Army as Automotive Advisers. The men applying have been automotive mechanics of some experience and included some of the Department's own maintenance men in the shops at Phoenix and the District shops. The men fill out two applications, to which is attached Mr. Steisel's recommendation, and these are forwarded for action to Fort Douglas, Utah, the headquarters of the 9th Corps Area.

Survey of Machine Tools

At the request of the WPB, a complete survey of the machine tools and operators available for war production was made by the Superintendent of Equipment. These listed not only the State Highway Department equipment but that in county shops, and in automobile repair shops and industries not converted to war work throughout the state.

Army-Navy "E" to Rogers

Rogers Bros. Corp., Albion, Pa., has been awarded the Army-Navy "E" for excellent production. This manufacturer is another devoting its efforts wholly to war production. In accepting this significant award it was stated, "Pride in accomplishment is overshadowed by sincere gratitude on the part of all."

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N. B., A two dollar bill, check or postage stamps will be entirely acceptable.

County Repair Garage Keeps Machines Going

(*Continued from page 14*)

ditches where it belongs.

County Equipment

Inasmuch as practically all heavy grading and surfacing is done by contract, the selection of equipment has been with a view to efficient maintenance. The equipment is divided between the three maintenance and storage garages in order to speed all maintenance operations. The equipment roster includes:

3 Caterpillar D7 tractors
2 Allis-Chalmers Model L tractors
1 Allis-Chalmers Model HD-10 tractor
3 7-yard LeTourneau Carryall scrapers
2 8-yard Gar Wood scrapers
1 7-yard Continental scraper
3 Caterpillar No. 12 motor graders
1 Caterpillar No. 112 motor grader
2 Caterpillar No. 11 motor graders
1 Allis-Chalmers No. 54 Speed Patrol
6 Allis-Chalmers Model K tractors with pull-type 14-foot blade graders
1 International TD-9 tractor with 14-foot pull-type blade grader
1 International T-35 tractor with 14-foot pull-type blade grader
2 Caterpillar D4 tractors with 14-foot pull-type blade graders
8 1½-ton dump trucks (1 Ford, 2 International, 5 Chevrolets)
5 Trucks with miscellaneous bodies

The county has no motor mowers, hiring farmers to do this work by hand where necessary. A power weed sprayer is a part of the county field equipment, using a commercial weed poison called Atlacide to fulfill the state law which requires that all noxious weeds, such as Canadian thistle and quack grass, must be destroyed on roadsides and private property. Where the work is done on private property, the county is reimbursed for labor and material. A LeTourneau electric welder mounted on a GMC panel truck handles repairs at all three shops and in the field.

A bridge crew is maintained and has as its equipment a 1,700-pound drop pile hammer with leads and a McCormick-Deering wheel tractor and hoist for operating it, a one-bag Wonder CMC concrete mixer and a 1½-ton Chevrolet truck.

The Marengo Garage

The county maintains a shop mechanic at the Marengo repair garage but has no mechanics at the other two garages. Either tractor operators or truck drivers or grader operators whose equipment is being overhauled assist the shop mechanic during the work.

The Central Garage at Marengo is a 32 x 80-foot frame structure, stuccoed outside and with a repair shop 32 x 24 feet. In the repair shop, the equipment includes a Sioux electric drill rigged for drill-press operation, a bench grinder and buffer, a Chicago Rivet & Machine Co. brake-band outfit, a Manley hydraulic press and a Quick-Way valve grinder.

The work bench has a tool board above it to keep tools off the bench when not in use and in plain sight so they will not be readily lost. A lock closet and bins are provided for supplies of cap screws, bolts and nuts, and close by are the lubricant-dispensing drums.

In the rear of the garage is an enclosed section for the storage of gaskets, radiator hose, special tools and parts and adjacent to it is the toilet and lavatory. The blacksmith and welding shop is set off by tile walls and contains a second-hand 12-foot lathe which is still performing wonders, an Ingersoll-Rand garage air compressor, a floor stand with grinder and buffer, a forge and anvil. There is a heavy rack for blacksmith iron, and a large overhead door admits direct to the blacksmith shop with another one giving access from the outside to the repair shop. Adjacent is a storage section capable of holding four trucks.

In a separate 36 x 40-foot shed is the oil storage room and a room with bins for bridge repair hardware, nails and wire. A separate locked room is provided for tire storage and truck supplies. Above the oil storage room are two 250-gallon diesel-fuel tanks, which are filled by pump from the wholesalers' oil truck, so that the fuel may be dispensed by gravity. Outside storage is provided for snow plows, bridge lumber and piles, culvert pipe and snow fence.

Administration

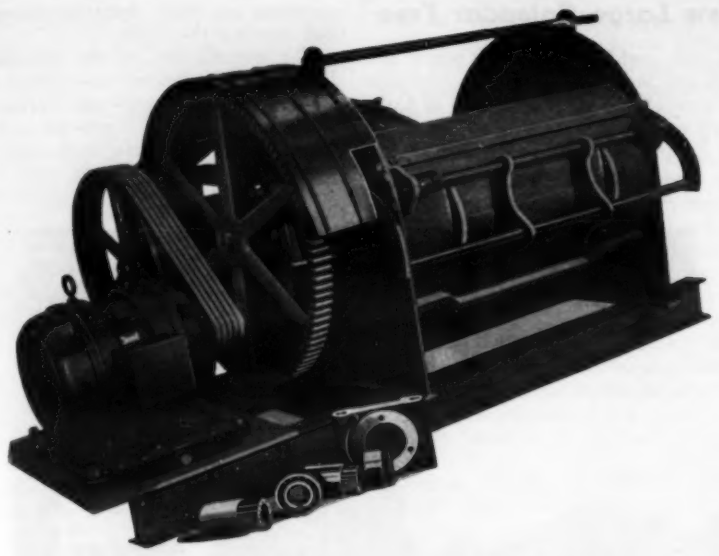
Three County Supervisors are elected in Iowa County for three-year terms. The Supervisors appoint the County Engineer for a term which may be as short as one year or a maximum of three years. W. K. Chantry, the present County Highway Engineer, has held that position for 12 years, prior to which he was Resident Engineer for the Iowa State Highway Commission.

Pick-Ups Maintain Ample "Flower Fund"

Passing the hat for flowers for Bill's wife who was ill, or for a present for Joe who had been a mechanic in the District for 20 years, became as irksome to the men in the District 4 shops of Division 1 of the Kansas State Highway Department as it probably has been in many other organizations where the hat is passed for every newly engaged girl in the office, or other event, in highway organizations or otherwise. Rather than put an end to the little courtesies which all appreciate at the time of family illness or bereavement, as well as at times of rejoicing, the men gave serious thought to establishing a permanent "Flower Fund" which would not be a burden to anyone.

Wise heads devised a system long ago, before salvage became a war necessity, but which now aids both the District "Flower Fund" and the war effort. The maintenance crews are working on the highways day in and day out, cleaning ditches, grading, repairing bridges, mowing shoulders and doing the many other necessary jobs of such crews. Their work takes them from right-of-way fence to right-of-way fence over many miles of road every day. That All-American habit, the carelessness of the public in using the roadsides as a trash basket, has been turned into an asset by these men.

The roadsides have produced an abundance of such things as automobile hub caps, old tires, scrap, bottles by the dozen, tools left by folks changing tires, and even an empty beer keg reputed to have had a salvage value close to $8. Most of the revenue, however, has come from beer bottles. So thorough has been the combing of the roadsides, without taking time from their official duties, that recently when five of the "boys" entered military service they each received a $5 gift from the Flower Fund, with money still left for other equally appreciated gifts. Long live the Flower Fund!



The Besser batch mixer for concrete-products plants.

Line of Batch Mixers For Concrete Products

The line of batch mixers made by the Besser Mfg. Co., Alpena, Mich., for plants producing concrete pipe, precast concrete curb, and similar concrete products, is available in models of 5, 12, 18, 25, 30, 40 and 50-cubic foot capacities.

One of the features of these batch mixers are the spiral blades, so set that they enter the mix easily and throw it in a figure-eight motion. This action gives a thorough mixing in a short time and requires little power. The blades and the drum liners are of Wear-Long wear-resistant metal for long life. A water pipe distributes water evenly the full length of the mixer, and if desired a water meter may be installed with the pipe. Any Besser mixer may be equipped with V-belt direct drive or a pulley for flat-belt drive. Anti-friction Hyatt bearings are used in all sizes, except the 5-foot, with Timken or SKF thrust bearings. Oversize square shafts with turned ends are designed to eliminate bending or twisting and provide a secure fastening for the blade arms. The low charging side is another feature of all Besser mixers, making possible the use of batchers and measuring devices to assure accuracy of proportions and to speed up loading. The mixers are self-discharging in 15 to 20 seconds. The discharge gate lever is conveniently located on the charging side, and the discharge gate locks automatically in either open or closed position.

The base on which the mixer is mounted is constructed of steel beams rigidly braced, but without unnecessary weight, and firmly welded into a solid unit. A solid base with the motor mounted on it is provided for the direct-motor-driven mixers.

Further details of the Besser batch mixers are given in a bulletin, copies of which may be secured direct from the manufacturer by mentioning this item.

Prefabricated Walls For Shops and Camps

A system of prefabrication of outside and inside walls of plywood has been devised by the Speedwall Co., Seattle, Wash. By this method of prefabrication, 16,705 board feet of lumber, 20,000 wood screws, 816 man-hours and 28,322 square feet of plywood were saved in the construction of the walls of the seven two-story Duration Dormitories at Bremerton, Wash., according to J. W. Bailey Construction Co. of Seattle, Wash. By using the prefabricated walls, complete with windows, doors and prefitted hardware, all of the plywood that would have had to be cut out of the ordinary panels for doors and windows was saved. With the stressed-cover construction of the wood-and-glue walls, the framing members and studding could be smaller, as the plywood bears the full share of the load of the wall. When plywood is glued to the framing members, the weight is distributed evenly and the walls are much stronger than when the weight hangs on the nailed members.

Construction of this type is of interest to contractors for shops and camps because of the economies. The prefabricated wall sections for these 28 x 148-foot two-story dormitories to house 81 men each were prefabricated in the Speedwall Co.'s "hot box" at the rate of 300 linear feet per hour, using Laucks thermo-setting synthetic resin glues. A total of 208,000 feet of plywood was used in the construction of the walls of the dormitories, with each dormitory using 1,820 linear feet of wall, including doors, windows, etc.

Further information on this prefabricated type of construction may be secured direct from Speedwall, and data on the synthetic resin glue from I. F. Laucks, Inc., 911 Western Avenue, Seattle, Wash., by mentioning this item and publication.

Bearing Lubrication In Textbook and Chart

A 32-page textbook filled with designs, formulae and graphs which explain the highly technical text on the functions of lubrication, use of oil, recommended viscosities, oil-supply systems, oil bath, circulating systems, spray or mist lubrication, wick feed, oil with compressed air, grease lubrication, how grease lubricates, ABEC grease standard, operating conditions, greasing intervals, grease supply systems, housing with grease fittings, housings without grease fittings, grease chamber lubrication, comparative advantages of oil and grease, high-temperature applications, minimum friction applications, protection against moisture, protection of idle machinery and cleaning, has been issued by SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

This book, "A Guide to Better Bearing Lubrication" may be secured free on request by equipment men and contractors interested both in the technical and practical side of bearing lubrication by writing direct to SKF and referring to this review.

Maritime Award to Marion

In recognition of outstanding production achievement, the U. S. Maritime Commission Board of Awards has awarded to the Marion Steam Shovel Co., Marion, Ohio, the Maritime M pennant and Victory Fleet Flag and Maritime labor merit badges for all employees. The Company has been building cranes varying in capacity from 3 to 43 tons for the Maritime Commission. These are mounted on steel portals or frames and are used in shipbuilding and for loading and unloading ships.

Paving Channel Slope On Flood-Control Job

(*Continued from page 2*)

Channel Excavation and Levees

Channel excavation consisted of the removal of sand, gravel, silt and clay. In this work the contractor used a Lorain 40 with a ⅝-yard Owen clamshell bucket, a Bucyrus-Erie 50-B steam crane with a 1¼-yard Blaw-Knox clamshell bucket and from time to time a 1¼-cubic yard Northwest dragline, a Lorain 80 dragline, and a 1½-cubic yard Link-Belt. In addition, a Page walking dragline, which was also used on levee construction, was employed for a time on channel excavation.

The levee section of about 7,400 feet has an 8-foot crown, with river-side slopes of 1 on 2½ and land-side slopes of 1 on 2. The levees were built by three Austin-Western 12-yard scraper wagons and trucks loaded by draglines. The material was spread by bulldozers mounted on D8 tractors, and compacted by sheepsfoot rollers pulled by D5 and D7 tractors.

Slope Paving

The banks of the Canisteo River above the Main Street Bridge were paved on a 1 on 2 slope working to a 1 on 2½ slope with a horizontal berm from the cantilever wall. After the rough excavation had been done by a crane, the slopes were hand dressed by a crew of eight laborers with one layout man and a foreman. The labor crew consisted of a raker, five shovel men, and two hand tampers.

Two longitudinal gravel drains run the entire length of each slope, the first being 18 inches from the toe of the slope and the second 8 feet above. The bottom of the drain is 1 foot wide horizontally from the slope, and the backslope is 1 on 1, making a triangular drain. On 10-foot centers along the gravel drain, weep holes of 4-inch pipe were installed. These were made of stove pipe and cut off with shears after the concrete was formed.

At the toe of each slope is a 4-foot high x 18-inch thick cut-off wall in the transition sections between the levees and walls. The channel is carried flush with the top of the wall which is backed up with dumped riprap for the full depth of the wall, 3 feet wide at the bottom and 7 feet wide at the top. The riprap stone for the operation weighed from 35 to 500 pounds. During concreting the wall trench was pumped out by an 8-inch Jaeger self-priming pump.

Corrugated metal bulkheads, painted on both sides, were installed on both sides of each 30-foot section of concrete slope paving. The reason for these bulkheads was that the plans required the slope to be poured in 30 x 30-foot concrete blocks. At the beginning of the work, it was necessary to pour one block and then skip a block. This was a nuisance to the contractor and slowed down operations, so permission was granted to use the metal bulkheads, which were left in place, and the blocks were poured consecutively, usually about four a day, with no checker-playing with the concrete. At every third section a special cut-off rib, 3 feet deep, was installed. This is of concrete, 2 feet wide at the top on each side of a special key joint and 1 foot wide on each side at the bottom. The key joint is an offset instead of the corrugated bulkhead and is faced on one side with ¾-inch Carey rubber filler. These cut-off ribs are carried 2 feet below the concrete slope paving. An equal-leg cap was placed on top of the expansion joint and pulled during the finishing, after which the slot was edged and sealed with asphalt.

The slope paving, 1 foot thick, is reinforced with ⅝-inch round deformed bars, hooked at both ends and placed on 18-inch centers both ways, 2½ inches from the top and bottom of the paving.

Concreting

Dry batches from the contractor's batching plant were mixed by a Rex 27-E, a MultiFoote 27-E and a Koehring 27-E paver. The bucket boom of the Rex paver was removed so that the batches of 1½-inch slump concrete, mixed 1½ minutes in the paver drum, could be delivered direct to a 1-yard Stuebner bottom-dump bucket set on the pavement immediately in front of the paver. The bucket was swung by a Bucyrus-Erie 50-B steam crane with a 60-foot boom. The three 2-batch trucks had a one-way haul of about ¾ mile from the batching plant to the channel paving operations. As the truck pulled up at the skip, one man cut the wire at the top of the cloth bags and emptied the cement on the batch.

After dumping the 1-yard bucket, the concrete gang spread the concrete uniformly over the slope and struck it off with a screed to grade. Finishers then went over the concrete to give it a float finish. One man used a Jackson vibrator to insure an absence of honeycomb in the cut-off wall and along the edges of each slab as poured, as well as around the reinforcing. Each slab was subjected to a continuous cure for 14 days, using river water pumped to a separate spray system. City water, metered at the hydrant, was used for all concrete mixing.

A considerable portion of the 48,000 cubic yards of concrete slope paving on this job was placed directly by the paver boom, as in road work, and some was placed by buggying.

Batching Plant

The contractor's batching plant was located on a siding near the Erie Railroad shops and yards. The two sizes of gravel and the sand were brought by rail from Franklinville, N. Y., and unloaded from the gondola cars immediately to stockpiles by a Lorain 77 with a 60-foot boom and a 1¼-yard Blaw-Knox clamshell bucket. The same crane kept the bins of the Blaw-Knox batching plant filled during operations. The batches were weighed out by Winslow government beam scales within the galvanized iron housing which completely enclosed the batching plant. During the winter, steam was admitted to pipes

(*Concluded on next page*)

New Large Calendar Free

A new weekly calendar on which the dates are indicated by 6-inch numbers has been offered free to readers of Contractors and Engineers Monthly by The Frederick Post Co., Box 803, Chicago, Ill., if they will write direct to the company on their business letterhead and mention this item.

The overall size of the calendar is 15¾ x 24½ inches and a section of technical data for engineers and draftsmen is included, containing charts on wire and sheet metal gages, screw threads, etc. Write promptly to secure your copy.

C. & E. M. Photo
A completed section of Massey concrete crib wall on the Hornell, N. Y., flood-control project.

Concrete Cribbing Wall on Hornell Job

(*Continued from preceding page*)

hung in the bins to prevent the aggregates from freezing.

After receiving their two dry batches of aggregates, the batch trucks drove to the cement car where one man put on five bags of cement for Class B concrete or 6 bags for Class A concrete.

The batch weights for the two types of concrete used were as follows:

CLASS A CONCRETE

Sand	1,391 pounds
No. 1 gravel	2,260 pounds
Cement	6 bags

Note: This batch was designed for 5.5 bags of cement per cubic yard, 5.5 gallons of water per bag of cement, and 38 per cent sand.

CLASS B CONCRETE

Sand	1,327 pounds
No. 1 gravel	1,289 pounds
No. 2 gravel	1,289 pounds
Cement	5 bags

Note: This batch was designed for 4.5 bags of cement per cubic yard of concrete, 6.5 gallons of water per bag of cement, and 34 per cent sand.

Concrete Cribbing Wall

A wall of precast concrete cribbing was erected for 700 feet along the left bank of the Canisteo River, with a maximum height of 25 feet and a 12 on 2 batter for the completed front face. The foundation started 4 feet below channel grade, and a 4-foot dumped riprap toe, 3 feet wide at the bottom and 7 feet wide at the top, was placed along the toe of the crib wall. This riprap consists of stone weighing between 35 and 500 pounds.

The initial operation was driving 12-inch H-beams on 10-foot centers along the neat line at the back of the wall. Between these H-beams, Interpile sheeting of 3 x 8 and 3 x 10-inch planks was placed horizontally as excavation progressed, with 1½ to 2-inch openings between the planks to permit complete drainage of the 25-foot bank of earth behind the sheeting. It was necessary to support this bank without movement as it carries one of the city's streets. Lateral support and alignment of these H-beams were maintained by welding to them another 12-inch H-beam placed horizontally at about one third the depth. This longitudinal support and each H-beam were heavily braced against the edge of the excavation by timber piles at the base of which, reacting against heavy timber sills, were two screw jacks for each pile to maintain a pressure on the pile and to take up any movement occurring in the earth against which the piles were braced. In front of this special sheeting, the contractor excavated all earth materials with a Marion steam crane and Owen ¾-yard clamshell bucket. No rock was encountered.

Massey precast concrete cribbing of the closed-face type was set either one, two or three cells deep, depending upon the height, immediately in front of the sheeting. All regular members of the cribbing are 6 feet in length, with the exception of some of the headers used in the two and three-cell type. These special headers are 4 and 10 feet in length.

Construction of the cribbing was started by placing several rectangular members under each cell parallel to the line of the crib. On these base members were placed regular headers with a T head. The headers are so placed at the end of the stretchers that two adjacent stretchers along the line of the crib have equal bearing on the header. A double row of eight headers was placed every 96 feet along the wall. Regular stretchers with notched ends, to form a closed face, were then placed on the headers to form the front face of the wall. All other stretchers were plain rectangular members. Extra bearing blocks were placed between the headers against the front stretchers to take care of extra bearing pressure for about one-half the height of the wall. A special stretcher which was slightly larger than those forming the front face was used at the top. There were also special end headers, with a 3-inch curb, used at the top of each vertical step of the finished wall profile. The slope between the top of the wall and the street grade is paved with 1 foot of hand-placed riprap with 6 inches of gravel backing.

While the foundation members and lower portion of the wall were being set, the excavation was unwatered by two 4-inch and one 2-inch pumps.

Quantities

Some of the major quantities included in this $1,466,560 flood-control contract are as follows:

Item	Quantity
Miscellaneous Class A concrete	300 cubic yards
Class A concrete	17,200 cubic yards
Class B concrete, in structures	2,350 cubic yards
Class B concrete, for paving	26,700 cubic yards
Channel excavation	380,000 cubic yards
Levee	220,000 cubic yards
Structural backfill	50,000 cubic yards
Structural excavation	58,000 cubic yards
Reinforcing steel	3,100,000 pounds
Structural steel, bridges	410,000 pounds

Personnel

The Mid-Hornell Channel Improvement Project was built under the direction of the Binghamton District Office, U. S. Engineer Department, Lieut.-Col. J. C. Marshall, District Engineer, with B. C. Samples as Resident Engineer. The contract for the middle section of the project at Hornell was awarded to Spencer & Ross, Inc., contractor, of Detroit, Mich., for whom Albert G. DiGiacinto was Superintendent and George Passwell was Managing Engineer.

C. & E. M. Photo

The effective bridge-painting outfit developed and used by Division 1 of the State Highway Commission of Kansas.

Big Scaffold Truck For Bridge Painting

The Bridge Crew of Division 1 of the State Highway Commission of Kansas has a special rig for bridge work which permits spray painting high up on trusses or beneath the deck. A ¾-ton GMC chassis with a stake body is used to carry a simple scaffold frame of 2 x 4's bolted to the bed of the truck. The frame fills the entire body so that the top section with a 3 x 6-foot platform can slide across from one side of the body to the other. This is effected by U-straps, bolted to the legs of the top section, encircling horizontal bars of the bottom frame. When not in use, the U-straps are unbolted and the top section lowered into the body by the 2-man crew.

Air for spray painting is supplied by a small Curtis air compressor, driven by a Wisconsin motor, mounted across the front of the body close to the cab. The area between these and the tail-gate is used for the DeVilbiss pressure container for the bridge paint, and for the other containers for vehicle and metallic paint. A constant pressure of 50 pounds for the operation of the spray nozzles is maintained by an air receiver made of a 6-foot length of 6-inch pipe immediately back of the engine and compressor. A pop valve on the DeVilbiss paint unit protects the system against high pressures. The engine speed also is controlled by a governor actuated by the air pressure.

This outfit was developed by mechanics of Division 1, Topeka, Kansas, under the direction of W. K. Dinklage, Division Engineer, and Bennie Owens, painter, State Highway Commission of Kansas.

Welding Awards Made By Lincoln Foundation

Construction men and construction equipment men figured prominently in the awards announced by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, in its nationwide 2½-year $200,000 scientific welding study program. This contest brought forth reports of welding progress from all sections of the country which show annual savings, based on representative products and structures, of approximately $1,825,000,000. According to Dr. E. E. Dreese, Chairman of the Lincoln Foundation, this saving includes 7,000,000 tons of steel valued at $271,000,000 and 153,000,000 man-hours of labor.

The first grand award of $13,700 went to Captain C. A. Trexel (CEC) USN and A. Amirikian, Director of Planning and Design and Designing Engineer, respectively, Bureau of Yards and Docks, Navy Department, Washington, D. C., for improved methods of design and construction of caissons for naval dry docks. Lesser awards went to Glenn L. Enke, Assistant Chief Engineer, Utah-Pomeroy-Morrison, Provo, Utah, for improved girder-type highway bridge design, and to Emanuel Scheyer, Assistant Designing Engineer, Designs Division, Board of Transportation, New York, N. Y., for improvements in the welded bents used for New York City subways.

Other awards in the construction field were made to John F. Willis, Connecticut State Highway Department, Hartford, Conn.; B. M. Shimkin, Bridge Department, Department of Public Works, Sacramento, Calif.; Harold Nagin, Reliance Steel Products Co., McKeesport, Pa.; and Guy H. Elbin, Franklin County Engineer's Office, Columbus, Ohio.

In the construction machinery classification, awards were made to William G. Gerstacker, Union Metal Mfg. Co., Canton, Ohio; Harry A. Roe, Sauerman Bros. Inc., Chicago, Ill.; Robert C. Shoemaker, Willamette Hyster Co., Portland, Ore.; M. Earl Lohr, Bethlehem Steel Co., Johnstown, Pa.; Raymond A. Beckwith, Koehring Co., Milwaukee, Wis.; E. W. Taylor and Herbert T. Kranz, Industrial Brownhoist Corp., Bay City, Mich.; Elliott F. Wright, Worthington Pump & Machinery Corp., Harrison, N. J.; August M. Stenger, Ingersoll-Rand Co., Painted Post, N. Y.; Hugh T. Monson, Euclid Road Machinery Co., Euclid, Ohio; Ralph M. Rush and H. A. Pietsch, Dravo Corp., Pittsburgh, Pa.; Ernest M. Collett, Archer Iron Works, Inc., Chicago, Ill.; Ken Wallace, Baker Mfg. Co., Springfield, Ill.; John H. Kincaid, Wellman Engineering Co., Cleveland, Ohio; Regis F. Fey, Pittsburgh Des Moines Steel Co., Pittsburgh, Pa.; R. S. Conabee, Lukenweld, Inc., Coatesville, Pa.; Walter J. Brooking, R. G. LeTourneau, Inc., Peoria, Ill.; William A. Eckley and Ralph W. Heer, Pioneer Engineering Works, Minneapolis, Minn.; George D. Becker, Allis-Chalmers Mfg. Co., West Allis, Wis.; George W. Mork and Howard Squires, Bucyrus-Erie Co., South Milwaukee, Wis.; H. N. Ekbom, Gustaf Johansson, Edwin Korensky and C. H. Nielsen, Link-Belt Speeder Corp., Chicago, Ill.; Eugene A. Balsley, Link-Belt Co., Chicago, Ill.; John P. Faber and Ann Lacamera, Ransome Machinery Co., Dunellen, N. J.; and Frederick W. Raab, Osgood Co., Marion, Ohio.

A New Mortar Cement For Stone Masonry

A booklet containing a complete history of Blue Bond mortar cement has recently been issued by the North American Cement Corp., 285 Madison Ave., New York City. Features of Blue Bond include its plasticity, high water retention, increased bonding power, strength, water repellency when set up, and low volume change.

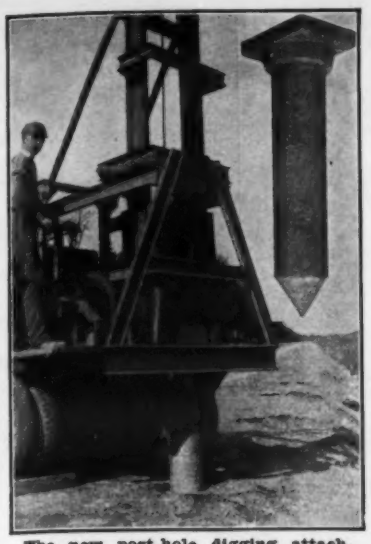
The booklet also contains tables on the cubic feet of mortar and number of masonry units required for various types of construction, and a special table on quantities of materials required for mortar using sands of different weights per cubic foot.

Copies of this booklet "Blue Bond for Masonry" may be secured direct from the manufacturer, or from this magazine, by mentioning this item.

Salvage Method Contest

A total of $650 in War Bonds has been offered for details of maintenance and salvage procedures using the metal-spraying process in industrial conservation and to speed war production. A first prize of $250, a second prize of $150, and a third of $100, with three additional prizes of $50 each, are being offered by Metallizing Engineering Co., Inc.

The contest closes December 15. Entry forms may be obtained from *Metco News*, 21-07 41st Ave., Long Island City, N. Y.



The new post-hole digging attachment for Novo pavement breakers.

Post Holes Punched, Saves Much Digging

A new attachment for the Novo pavement and concrete breaker makes the job of digging post holes for highway guard rails a much faster job than heretofore. A heavily reinforced pointed cylinder pouch placed on the end of the 3,300-pound hammer in place of the breaking nose has been successfully used on various types of grades where guard-rail posts were to be placed. On the average, only three blows of the hammer are required to put down the post hole with this punch, saving considerable time and labor in this operation. Two hundred post holes can be dug in an average day, it is stated.

This accessory can be used on any of the Novo breakers in the field or furnished with a new outfit. It increases by one more job the operations the breaker is used for, such as breaking out all kinds of pavement on repaving and relocating jobs. Furnished with a special cutting nose, it can be used for cutting trenches in the pavement without destroying the balance of the slab. A long blade can be used on the hammer for cutting frozen ground on winter digging jobs.

Complete information regarding the post-hole punch and the Novo pavement and concrete breaker will be furnished direct by the Novo Engine Co., 216 Porter St., Lansing, Mich., to those mentioning this item.

Quick Belt Repairs Save Time and Cash

A new 8-page booklet containing an illustrated step-by-step procedure for making repairs on conveyor belts by the use of portable electric vulcanizers, has just been published by the B. F. Goodrich Co., Akron, Ohio. This booklet "Rubber Conservation for Users of Industrial Rubber Belting" tells how you can save rubber by making vulcanized repairs promptly, by salvaging belts for smaller drives, and by using the Plylock splice.

The illustrations are particularly pertinent in that they show each step in this program for the conservation of conveyor belts. Interesting examples of savings already made and valuable rubber conserved are given. These include the saving of 2 tons of rubber in a large conveyor belt by making vulcanized repairs and cutting down old belts and by removing worn plies, changing them into belts for smaller drives.

A copy of this booklet is available upon request direct to the manufacturer to those mentioning this item.

Heavy-Duty Trailers

Sturdy trailers of goose-neck construction for hauling heavy construction equipment and built in capacities from 5 to 100 tons are illustrated and discussed in a new 12-page bulletin issued by C. R. Jahn Co., 1345 W. 37th Place, Chicago, Ill. These units are made as four-wheel trailers in 8 to 14-ton capacities, as six-wheel trailers in 15 to 30-ton capacities, ten-wheel trailers of 35 to 40-ton capacities and twelve-wheel trailers of 45-tons capacity and up. All of the models are easily and quickly convertible from full to semi-trailer by simply disconnecting the king-pin lock and removing the front dolly. No structural changes are necessary.

Copies of the new Jahn Bulletin No. 542 will be sent promptly by the manufacturer to those requesting it.

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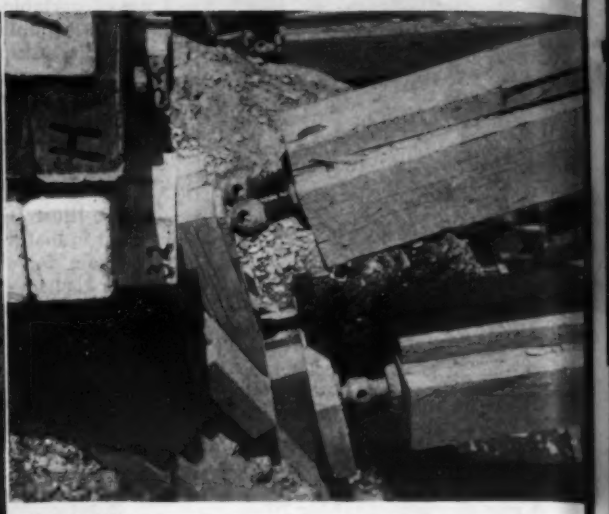
Contractors and Engineers Monthly

C. & E. M. Photo
A general view of the Interpile sheeting used by Spencer & Ross along the Canisteo River at Hornell, N.Y., to hold high banks. See page 2.

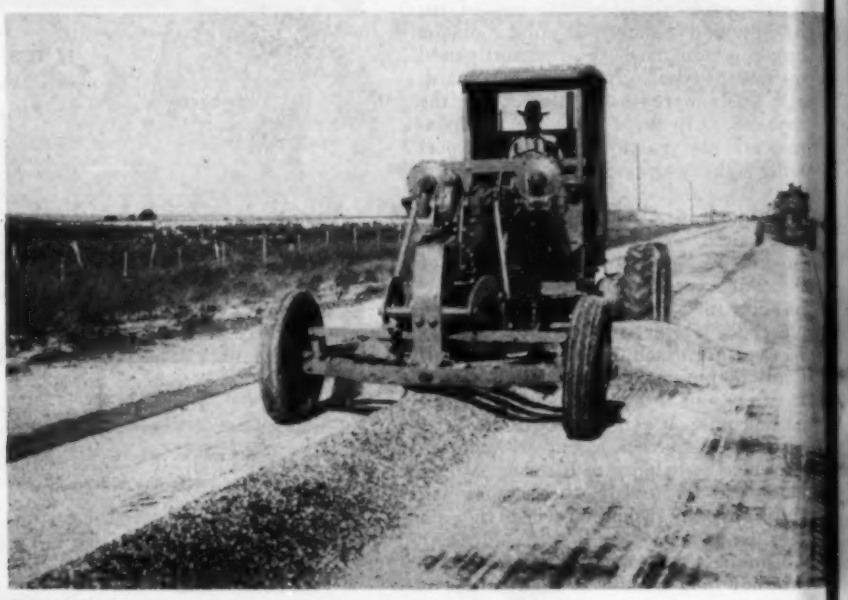


C. & E. M. Photos
At left, close-up of the Interpile sheeting, showing the g packing and openings between planks to permit drainage of 25-foot bank of earth; above, the screws for tightening the in for the Interpile sheeting on the Spencer & Ross job.

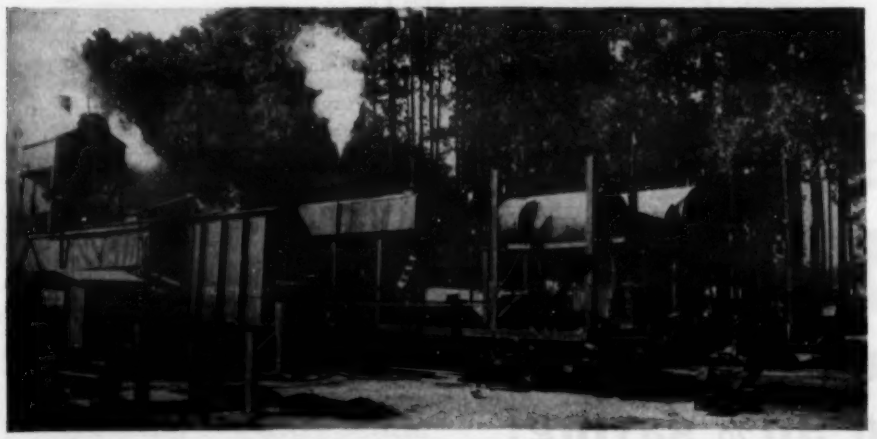
C. & E. M. Photo
Above, a rotary broom filled with maple "skivings," a substitute for rattan which the New Hampshire State Highway Department finds very satisfactory. This is one of a number of New Hampshire's economies and substitutions. See page 2.

Below, old blades welded to new ones make it possible for New Hampshire to get double the service from its snow-plow blades—a necessary war economy. See page 2.

C. & E. M. Photo

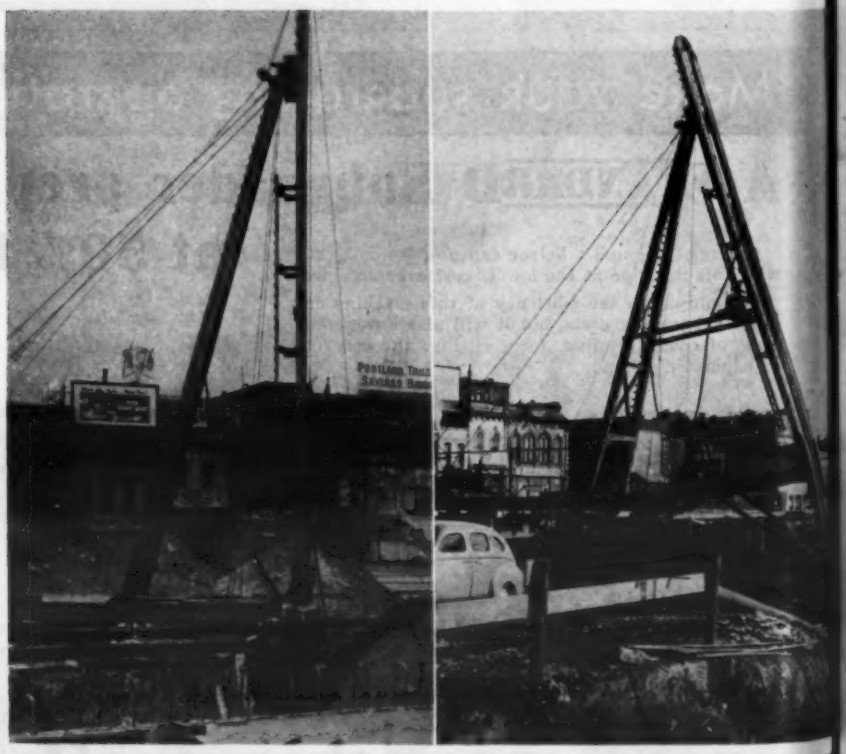


C. & E. M. Photo
An Adams power grader mixing the first application of asphalt and chips, followed by second grader, on a Texas retread job. See page 21.



C. & E. M. Photo
The storage car, an important part of the three-car portable asphalt plant of the Highway Construction Co. of Brunswick, Ga. The car has a 25-ton asphalt tank, three cylindrical fuel tanks and transfer pumps. See page 7.

C. & E. M. Photo
A Page 621 Walker with a 125-foot boom and 6-yard Page bucket roughing in Willow Creek levee 7 miles south of Beardstown, Ill. See page 11.



The unusual pile rig used by Birkemeier & Saremal of Portland, Ore., on its contract for t west approach to the Morrison Street Bridge, a part of the Front Avenue Improvement Portland. At left, the rig is in position for driving vertical piles, showing the ball and soc joint assembly at the top, and at right the rig in position for driving the batter piles at inches to the foot. See page 9.